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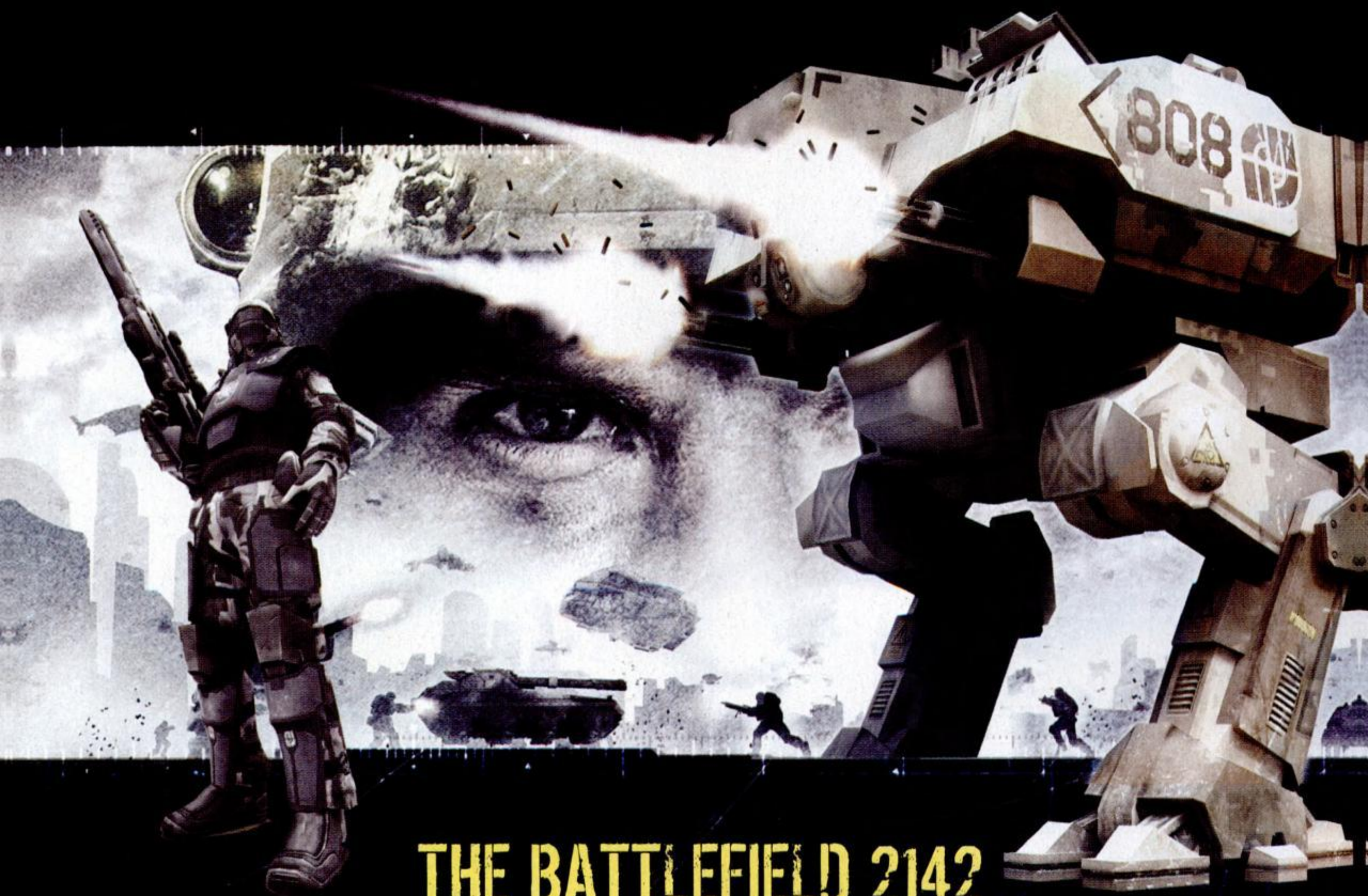

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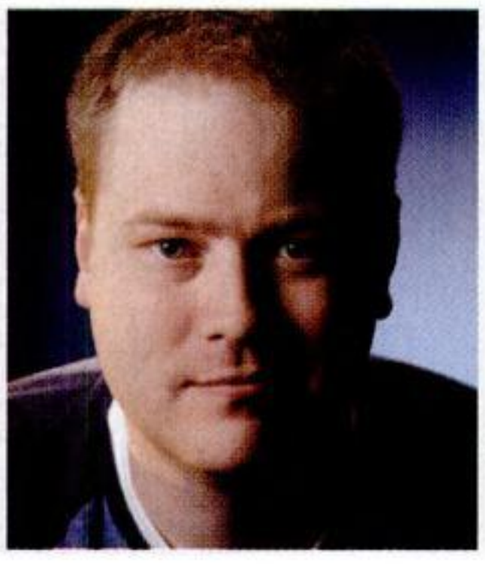
Ed Word



Microsoft's Licensing Madness

The controversy du jour regards a particularly abhorrent clause that Ed Bott noticed in Microsoft's end-user license agreement for Vista (full story on his blog here: **http://tinyurl.com/yx9nxv**; EULA is here: **http://tinyurl.com/ydyw2f**). Most software EULAs are documents filled with nasty lists of things that you can't do with the software you purchased, but the clause Microsoft snuck in unannounced is especially evil. It's titled: "Reassign to another device."

Here's the exact text: *"The first user of the software may reassign the license to another device one time."* That means that if you purchase a copy of Vista at retail—be it the $200 Home Basic or the $400 Vista Ultimate package—you have the right to install that OS on one machine. When you retire that machine, you can install the OS on a second PC, but that's it. Unlike the Windows XP EULA, which permits you to continue transferring the OS indefinitely (as long as you remove it from the old machine), Vista's EULA restricts each copy of the OS to two computers.

Naturally, the new policy will be enforced using Product Activation. Upgrade too much hardware, too many times and *Microsoft will disable your legally purchased version of Windows Vista.* Frighteningly, none of the Microsoft representatives I've spoken with can specify what determines the difference between a hardware upgrade and a new machine; all they'll say is that it's a complicated algorithm.

This makes Vista very, very unattractive for anyone who builds his or her own rigs. Vista will force people who frequently build new machines or do regular upgrades—like you and me—to pay Microsoft a couple hundred bucks a year for the privilege of running Vista. I've had a few problems with Vista, but I'm ready to drop WinXP. But it will be a cold day in hell before I pay multiple times for the same piece of software for the same PC. That's highway robbery.

Why is Microsoft doing this? Because it can. There will be relatively few people affected by this license change, as the vast majority of Vista builds will end up in OEM machines purchased by people who don't upgrade. Indeed, even if everyone who's affected by this clause decides to boycott Vista, it won't make a measurable impact on sales.

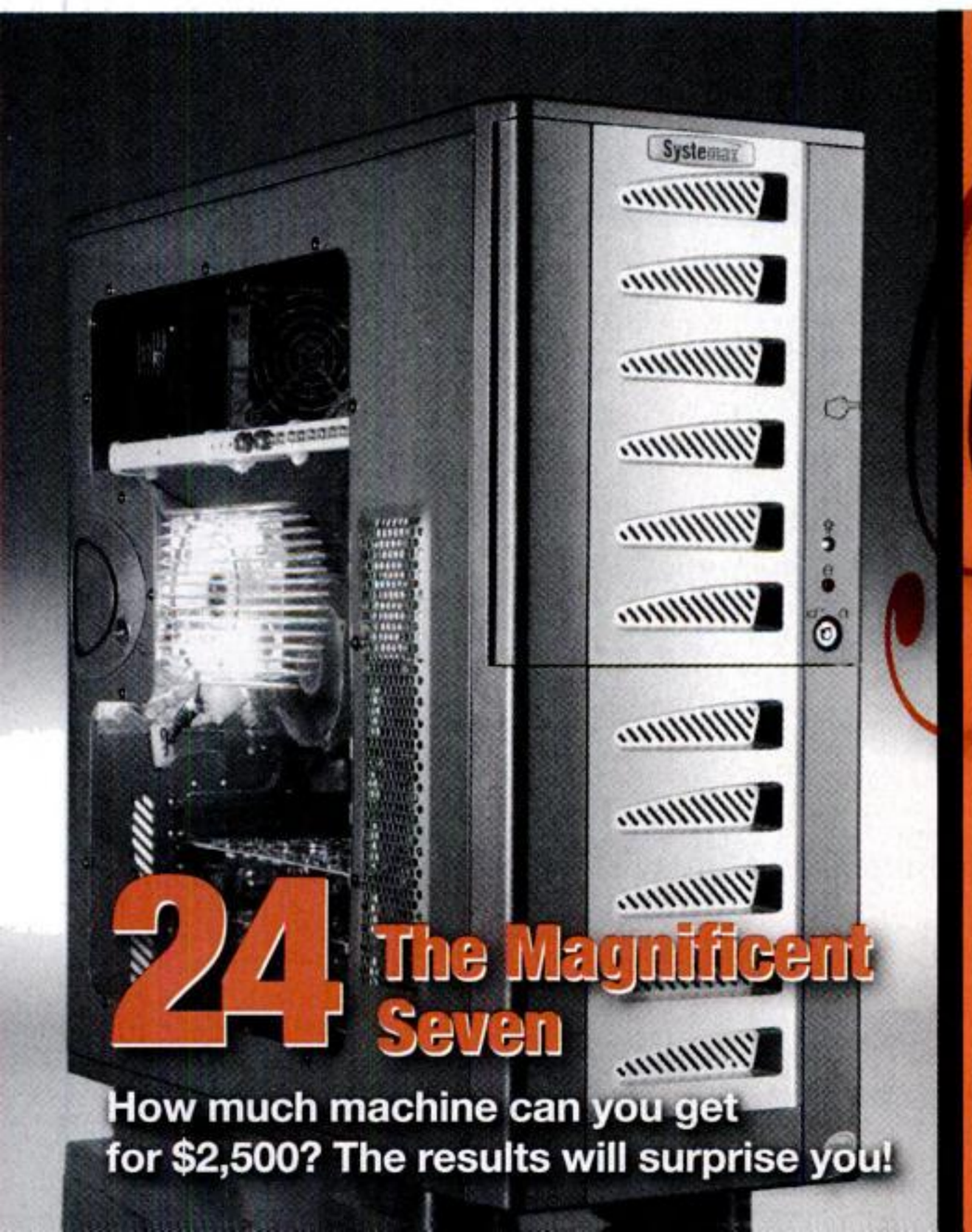
I've never been more conflicted about a product before. If the EULA remains as-is, I'll be unable to recommend Vista to the *Maximum PC* elite. The hitch is DirectX 10, which only works with Vista. I just saw the first batch of games written for DirectX 10, and they make "next-gen" console titles look like bantha fodder. Every hardcore gamer will be forced to make a Hobson's choice.

This is a dark day.

Will Smith

Please send feedback and chocolate upside-down cake to ***will@maximumpc.com.***

Features



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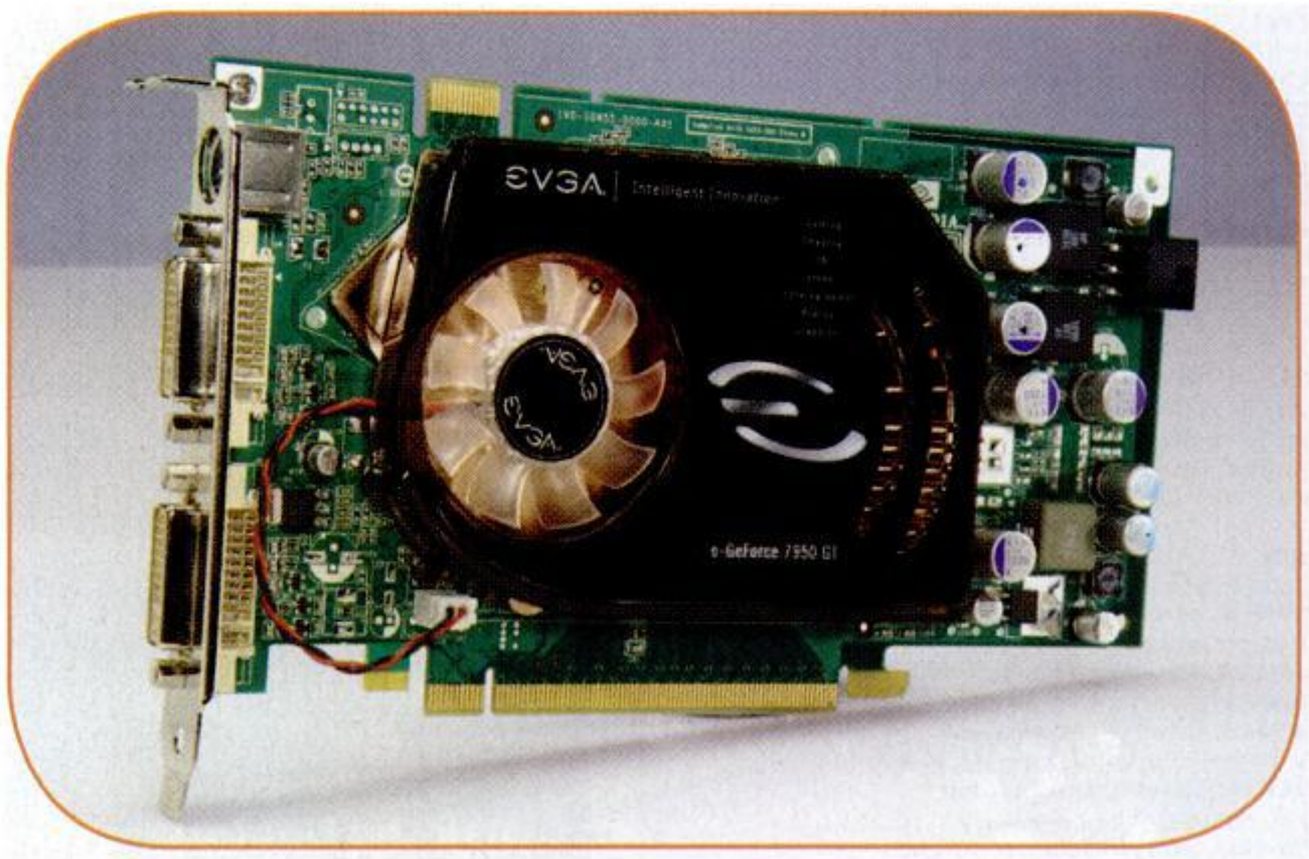
The Great Graphics Shakedown

As AMD moves to buy out ATI, the CPU war could spread to your PCI-E slots



Will the merger between AMD and ATI leave Nvidia-philes out in the cold?

AMD's strategy of expanding into the chipset and GPU markets by acquiring ATI has cleared every regulatory hurdle to date, leaving little doubt that the deal will close by the end of 2006. Here's what we know so far.

With AMD and ATI both playing second banana in their respective markets, the merger seems to be a win for each. AMD desperately needs a foothold in both the chipset and graphics-processing unit (GPU) businesses to compete with Intel. Corporate desktop and notebook makers prefer to purchase as many components as possible from the same manufacturer, which has historically given Intel an edge in these markets. ATI, meanwhile, should benefit from access to AMD's engineering and manufacturing resources as it wages war with Nvidia.

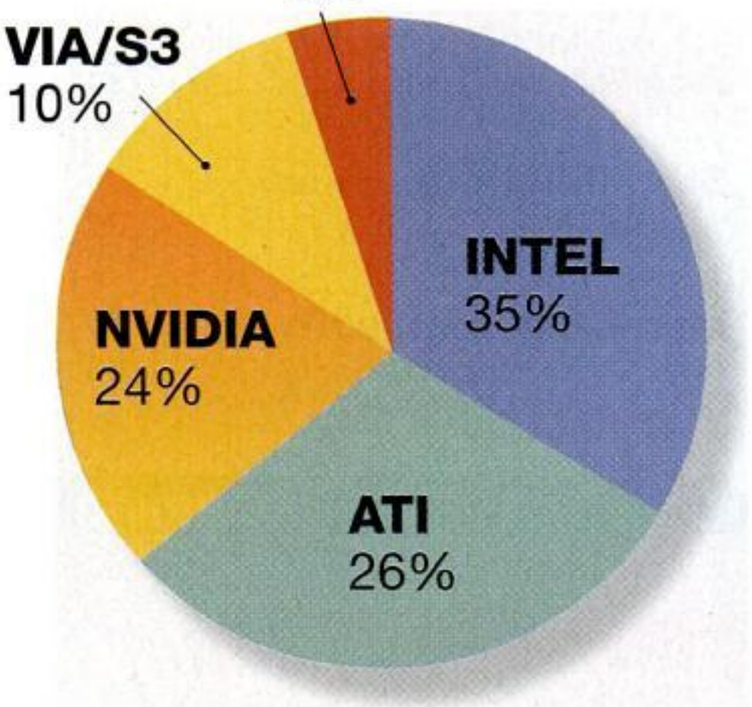
ATI's chipset business generates plenty of revenue—on the order of $80 to $100 million per quarter in Intel-compatible parts alone—but it produces relatively little bottom-line profit due to razor-thin margins. The company has a tough time competing against Intel for reasons that parallel AMD's challenges: Intel can offer hefty discounts on its own chipsets to customers who also purchase Intel CPUs. The ATI acquisition enables AMD to play the same game.

ATI contracts with the Taiwanese foundries TSMC and UMC to fabricate its chips. But AMD, like Intel, owns its own foundries. And like Intel, AMD should now be able to amortize those investments over a longer period. As the company shifts CPU production from older 90-nanometer to newer 65nm fabs, it'll be able to use those 90nm factories to churn out ATI-designed chipsets and GPUs.

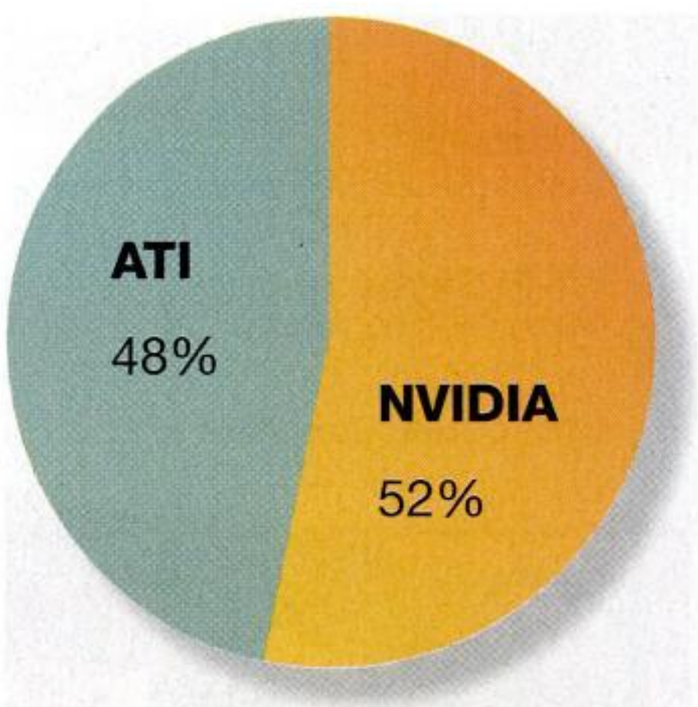
Whether ATI can continue manufacturing Intel-compatible chipsets, on the other hand, is an open question: Will Intel continue licensing its technology to a company now owned by its biggest rival? ATI's RD600 chipsets, which are compatible with Intel's Core 2 Duo and Core 2 Extreme, are ready to go; in fact, details about an upcoming RD600-based motherboard from DFI were trickling onto the web as we went to press. But that's only one vendor; what about the rest of the market?

Our sources tell us that ATI is convinced its AMD hook-up won't impact its rapport with Intel, in part because Intel has such a poor relationship with Nvidia (my enemy's enemy is my friend, as it were). Any move by Intel to revoke ATI's bus license might also draw unwanted attention from U.S. and European anti-trust forces. We predict that attempts by Intel to acquire Nvidia would have the same impact.

Nvidia, for its part, seems convinced that the ATI acquisition is great news—that ATI is raising the white flag of surrender. Nvidia has been firing on all cylinders, and it has already beat ATI to the punch with Direct3D 10 GPUs. But Nvidia would be foolish to dismiss this development out of hand. After all, ATI is joining forces with a company that took on mighty Intel and won—at least for a while.



Desktop Graphics Market Share Q2 '06



Discrete Desktop Market Share Q2 '06

When you look at the graphics market in total, Intel is the undisputed king of the mountain; Nvidia, surprisingly enough, takes third place behind ATI. But the outlook shifts dramatically when you examine the market for discrete desktop GPUs—the parts that we as power users care about most: Intel is out of the picture, and Nvidia beats ATI by just four percent.

Market-share data courtesy Jon Peddie Research.

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Google + YouTube = ?

Google to buy out YouTube as sixth sign of the coming apocalypse

If you can't beat 'em, buy 'em. At least that seems to be the thinking over at Google these days as the company enters into a $1.6 billion deal to acquire its scrappier and more popular online-video competitor YouTube. The move has obvious benefits for Google, whose own video-streaming service—launched last January—couldn't touch the traffic heading to YouTube. YouTube streams a whopping 100 million videos daily. Perhaps even more important are the partnerships YouTube forged with most major motion picture studios, music labels, and television networks—as well as the potential for lucrative advertising contracts.

What's less clear is how this deal will benefit consumers. If Google absorbs YouTube into the Google Video brand, it will leave a massive chasm where YouTube used to be. But it's only a matter of time before some newer, scrappier service fills the gap.

Retailers Cry Foul over Online Movies

In the wake of movie download launches from Apple iTunes and Amazon Unbox in September, retail giant Target is pitching a fit. In a letter to movie studio representatives, Target president Gregg Steinhafel threatened to reduce the amount of shelf space it devotes to movies unless studios could ensure equity pricing among the different movie-distribution methods.

Frankly, we're a little mystified by the concern. At press time, the price difference between online and retail versions of major new releases was negligible. For instance, *X-Men 2: The Last Stand* sold on Unbox for $14.95, while Target offered it at $14.98, and the same trend held true for just about every new release we looked up. If anything, we're annoyed that the DRM-encumbered online versions aren't a whole lot cheaper than the easily ripped DVDs.

10MP Camera Phone Arrives

Samsung's B600 breaks the 10-megapixel barrier

FRONT *BACK*

With a massive 3x zoom lens embedded in its backside, the Samsung B600 is the world's most powerful camera phone. For now.

FAST FORWARD

TOM HALFHILL

Quad-Core Trade-Offs

By shipping its first quad-core processors in November, Intel is beating AMD by at least six months. AMD doesn't expect to deliver its first quad (Barcelona) until mid-2007. But Intel's initial quads are actually pairs of dual-core dies slapped together in the same chip package, whereas Barcelona will integrate four cores on a single die. Some critics say Intel is cheating.

I don't call it cheating, but I do use another term Intel doesn't like: "stopgap measure." I think a multichip module (MCM) is a compromise on the way toward a tightly integrated quad-core die. Intel argues that stuffing two dual-cores in one package is an equally valid method of creating a quad-core processor and even has some advantages.

If this debate sounds familiar, it's because we're in the second round. Last year, Intel introduced its first dual-core processors. The Pentium Extreme Edition 840 (Smithfield) united two Pentium D cores on a single die, but with minimal integration. The Pentium Extreme Edition 955 (Presler) crammed two Pentium 4 cores in an MCM. Six months later, Intel rolled out its first "monolithic" dual-core chips, which integrate two of the latest Core processors on a single die.

Then, as now, Intel argued that pairing separate dies in one package can save money by boosting production yields. If one core is defective, Intel discards only the die having that core, whereas if one core on a monolithic die is defective, the whole die is trashed, even if the rest of the chip is OK. In addition, Intel can bin-sort the production output to find the best-matched pairs of dies. Intel tests and sorts the chips according to their clock speeds, voltages, and other characteristics.

Intel's points are sound. But it's also true that MCMs are more difficult and costly to manufacture, which partly negates the advantages of bin-sorting. Also, Intel's MCMs are poorly integrated. The new quads, like their early dual-core predecessors, must route all core-to-core communications through the front-side bus instead of through tightly integrated interconnects. That detour saps performance.

Intel doesn't plan to introduce monolithic quad-core processors until at least the second half of 2007. When those chips appear, don't be surprised if Intel touts the advantages of monolithic integration.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

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GAME THEORY

THOMAS MCDONALD

Defending the ESRB

Is the Entertainment Software Rating Board (ESRB) a fig-leaf for the insidious attempts of a corrupt game industry to poison the minds of our children, with powerful game companies manipulating the system to hide extreme game content? Or does it, as some say, provide *too much information* with its hopelessly intricate tangle of ratings and "descriptors," thus reducing parents to helpless sobs of confusion as they shout "Oh, ESRB, please just tell me what is in this game!"? By this logic, more is less. Detailed descriptors such as "Blood and Gore / Use of Drugs / Nudity" are somehow too arcane to understand. Telling parents that a game contains "Perverted acts committed with a Teletubby" would still leave them wondering what's in the box.

This is nonsense. Games are now labeled with the best media rating system ever developed, remarkable for its depth and clarity. It continues to be tweaked and refined by adding levels, tightening the procedures, and clarifying the descriptors. Almost 40 years after the development of the MPAA system, movie ratings can still be arbitrary and contentious. That the nascent computer and video game industry evolved such an outstanding system in such a short time is a credit to our industry.

Unfortunately, The Dark Gods of Washington don't take credit, only cash. After politicians demanded action from the game industry, they got it with a comprehensive ratings system that clearly labels the content of every game. This didn't have the desired effect of making perennially irresponsible tumors like Rockstar Games vanish in a puff of smoke and sulfur, so the politicians raised the bar. Now we're facing The Truth in Video Game Rating Act (S.3935), which aims to *federally mandate* that the rating board plays through each game *in its entirety*, which is plainly impossible.

That some so-called Conservatives continue to lead this intrusion into the private sphere is a source of great shame to those of us who take the ideals of limited government seriously. By continually raising the bar, the anti-gamers have proven that they don't want the game industry to act responsibly to keep mature content out of the hands of children. They simply want to shut us down.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

Researchers Use Plant Virus to Create Fast Transistors

Is sickeningly fast RAM on the horizon?

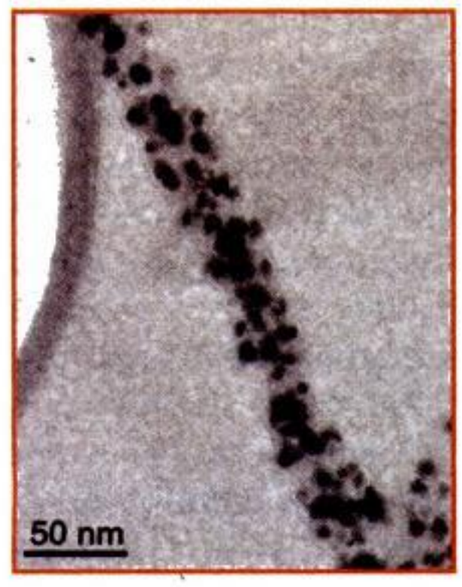
A group of UCLA researchers say they have created a faster type of transistor that could one day replace flash memory, using a destructive plant virus.

The researchers used parts of the tobacco mosaic virus coated with platinum nanoparticles. When a small electrical charge is applied, the result is a transistor that can open and close about 10 times faster than today's fastest flash RAM.

The scientists expect to build a prototype within four years using several million virus parts, but they do not address how dangerous the RAM would be.

The tobacco mosaic virus can infect more than 150 types of plants, but tobacco is especially susceptible. It's the most persistent plant virus known and can survive up to 50 years in dried plant parts. It can lie dormant in cigars and cigarettes, which when handled or smoked can pass the virus along to household plants.

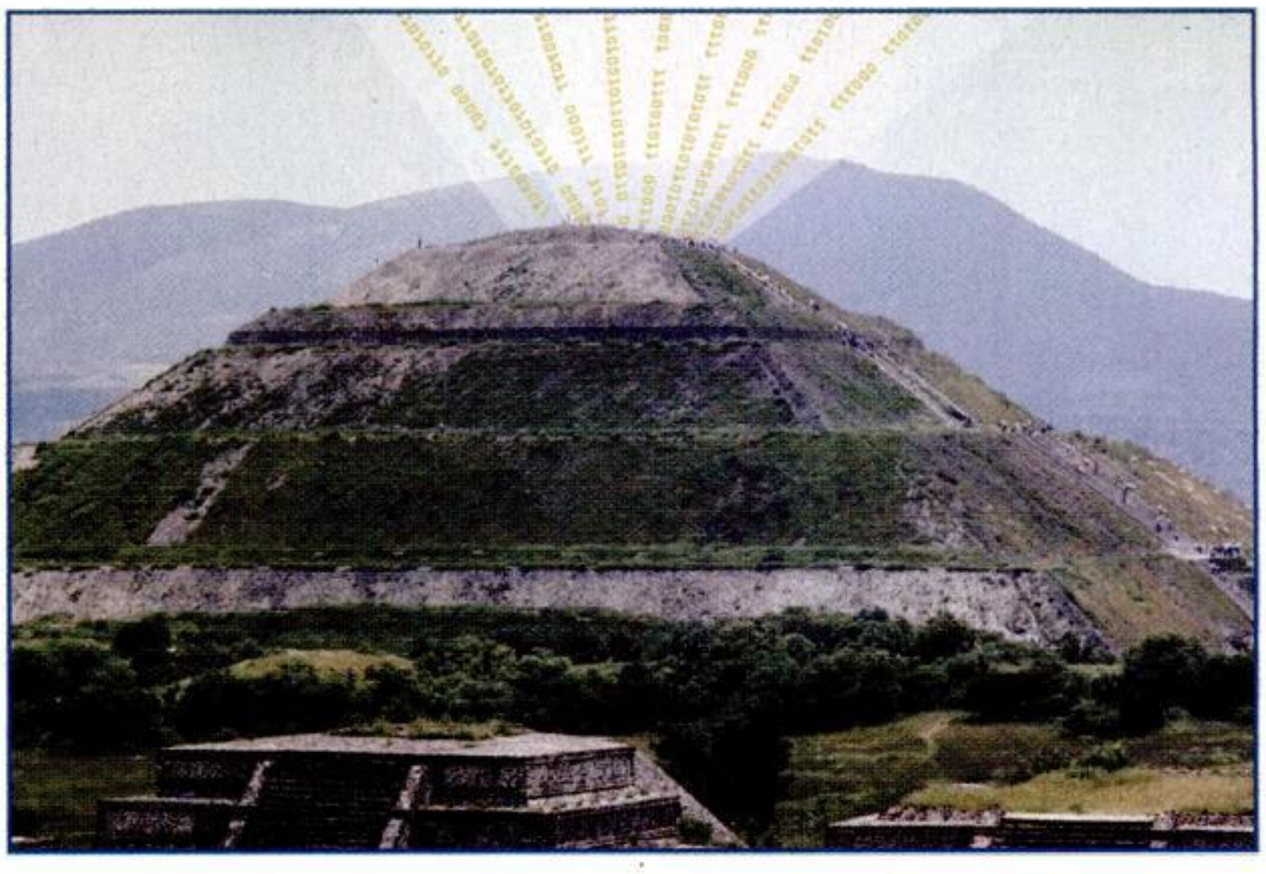
To date, no hard drives have been infected.



The tobacco mosaic virus is one of the world's deadliest plant viruses.

Message in a Beam of Light

Not content to sit back and allow our generation to vanish into obscurity, Yahoo is building a time capsule. But unlike the shoe boxes full of knickknacks we buried in our backyards as kids, this one will be entirely digital. The company collected submissions online at http://timecapsule.yahoo.com until November 8, and now plans to beam the digital capsule into space from the top of the Pyramid of the Sun in Teotihuacán, Mexico.



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...continued from page 3

As the story continues to unfold down here on Earth about what may or may not be happening on the ship orbiting the planet, one thing's for sure, if those people are to [illegible] it will be thanks to their efforts

[illegible] first place Tommy even [illegible] on the recommendation from [illegible] people [illegible] taken. He was [illegible] life [illegible] mechanic [illegible] girlfriend, Jen, [illegible] It's a good [illegible] for all of them up there that Jen [illegible] reluctant to go.

Tommy has never been very int[illegible] his ancestry, but if you ask his co[illegible] they'll tell you that he holds those cl[illegible] him very dear. He'll go to any length[illegible] protect the people he cares for.

The only thing we know about the h[illegible] ship that's circling us and stea[illegible] us [illegible] random is that no one come[illegible] there. We can only assume th[illegible] being enslaved, killed or worse. [illegible] is an option, and if you ask what [illegible] worse than being killed, just think abou[illegible] for a second or two.

To combat forces like this someone needs to be relentless, tough, fearless and quick. Tommy embodies all of these characteristics and more. He has always been athletic. Blessed with a physique that holds muscle and a mind that keeps him alert, the Cherokee mechanic is ready for anything. Rest assured, his skills are facing the ultimate test as we speak.

He's always been in search of the ultimate adventure. Those who worked at the roadhouse with Jen remember him coming in before quitting time. "He would sit at the end of the counter and look through books about big cities, small campgrounds, beaches and foreign countries. The whole time, you could see the sparkle in his eyes like he was imagining himself in those pictures," says a waitress named Dawn.

His grandfather once echoed those [illegible] can not control w[illegible] wants. I chos[illegible] my life. He must ch[illegible]s," he said.

Shortly before the abduction, Tommy began telling those close to him that his grandfather, now deceased, had been appearing to him. If this is true, it's likely that his grandfather is up there with him now acting as a spiritual guide and helping him to make all the right decisions.

It's safe to say that this is the adventure he was looking for, he's got more than he can handle right now. Telescope images of the space ship reveal a sinister exterior. If the outside looks that bad, it's safe to say there's no carnival going on inside. Except maybe for Tommy. This could be just what he's been dreaming of. It might just be what inspires Jen to tell him she's ready to see the rest of the world with him. If they can just make it home first.

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USB THUMB-DRIVE SOFTWARE

U3 **vs.** Ceedo

In the future, we'll be able to tap into our brains' unused potential to carry massive amounts of data—Johnny Mnemonic-style. Until then, we remain tethered to our trusty USB thumb drives—the most useful of which have boasted bundled *U3* software. With its built-in Launchpad interface, *U3* lets you carry not just files, but entire applications everywhere you go. So no matter where you are, as long as you have access to a Windows 2000 or XP computer, you can plug in your thumb drive and partake of your own preconfigured browser, mail reader, and just about any other app you might need.

Now *Ceedo* is giving *U3* a run for its money, offering the same portable goodness in a package you can download and install to *any* USB drive. To find out which thumb-drive launcher rules the portable roost, we put these two software packages to the test.

BY ROBERT **STROHMEYER**

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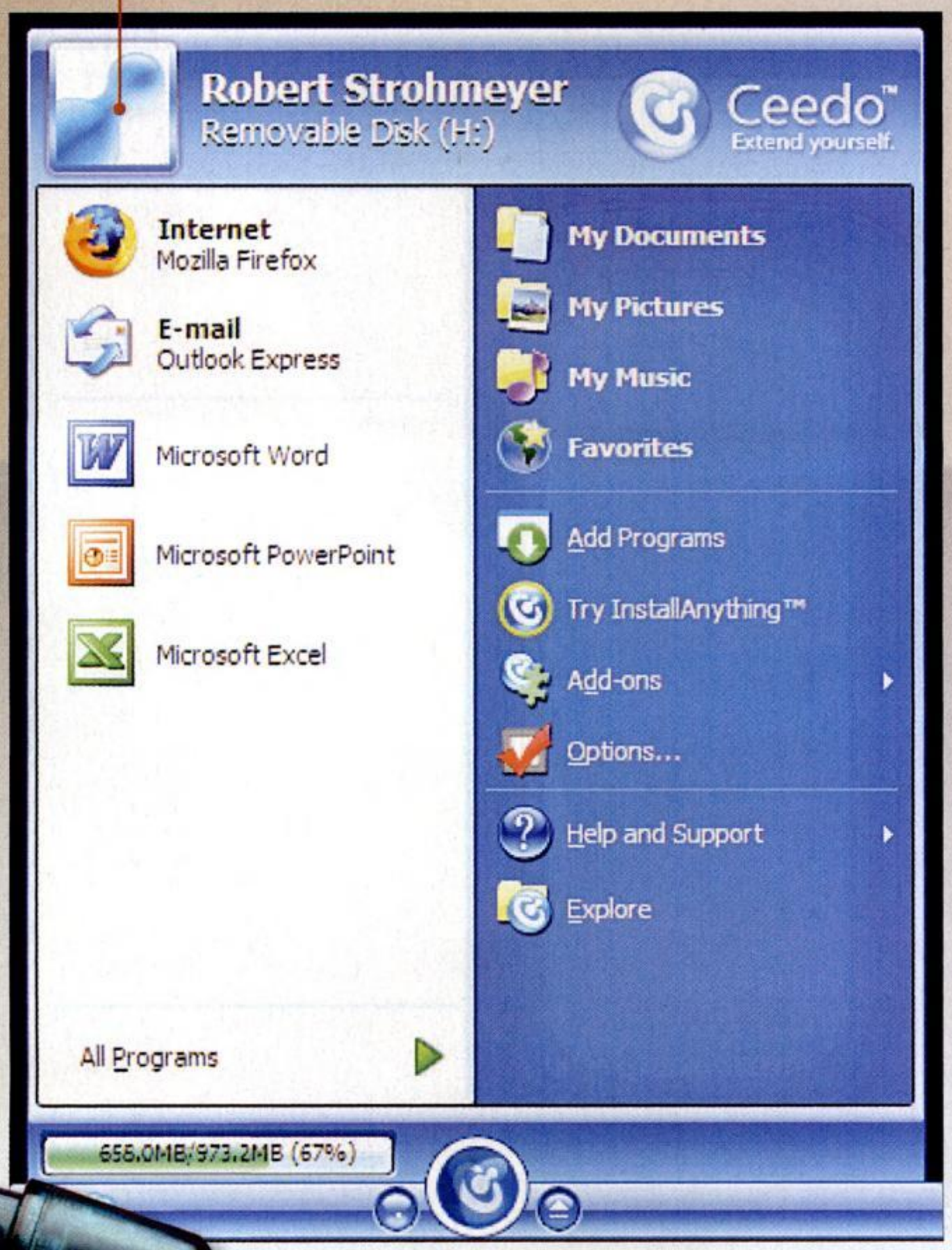

round 1

VERSATILITY The biggest reason to use thumb-drive software is to take personalized apps and data everywhere you go, so the hardware you run it on can be almost as important—sometimes even more important than—the software itself. *Ceedo* bursts out of the gate with a big lead here, because it installs on just about any USB device you can get your hands on, from thumb drives to flash cards to USB hard drives. And while you can only install the app on one device per license, that's no different from *U3's* license, which is tied to whatever thumb drive it came preloaded on.
WINNER: CEEDO

round 2

GUI Both *U3* and *Ceedo* model their launchpad interface on the Windows Start menu, while taking a few liberties in the interest of adding features. Of the two, *U3* is the less obtrusive, restricting its launcher to the system tray where it stays out of your way. Once you launch it, however, you'll see a fairly familiar-looking menu replete with icons for settings and applications. *Ceedo* takes a similar approach, but enhances its launcher with a funky little quick-launch pad that sits just above your task bar. So when you need fast access to an app you use often—say, *Firefox* or *Thunderbird*—it's just one click away. To get autoplay working properly, *U3* represents itself as an optical drive and a removable storage device to your operating system, which can get annoying when you're looking for your files in a hurry.
WINNER: CEEDO

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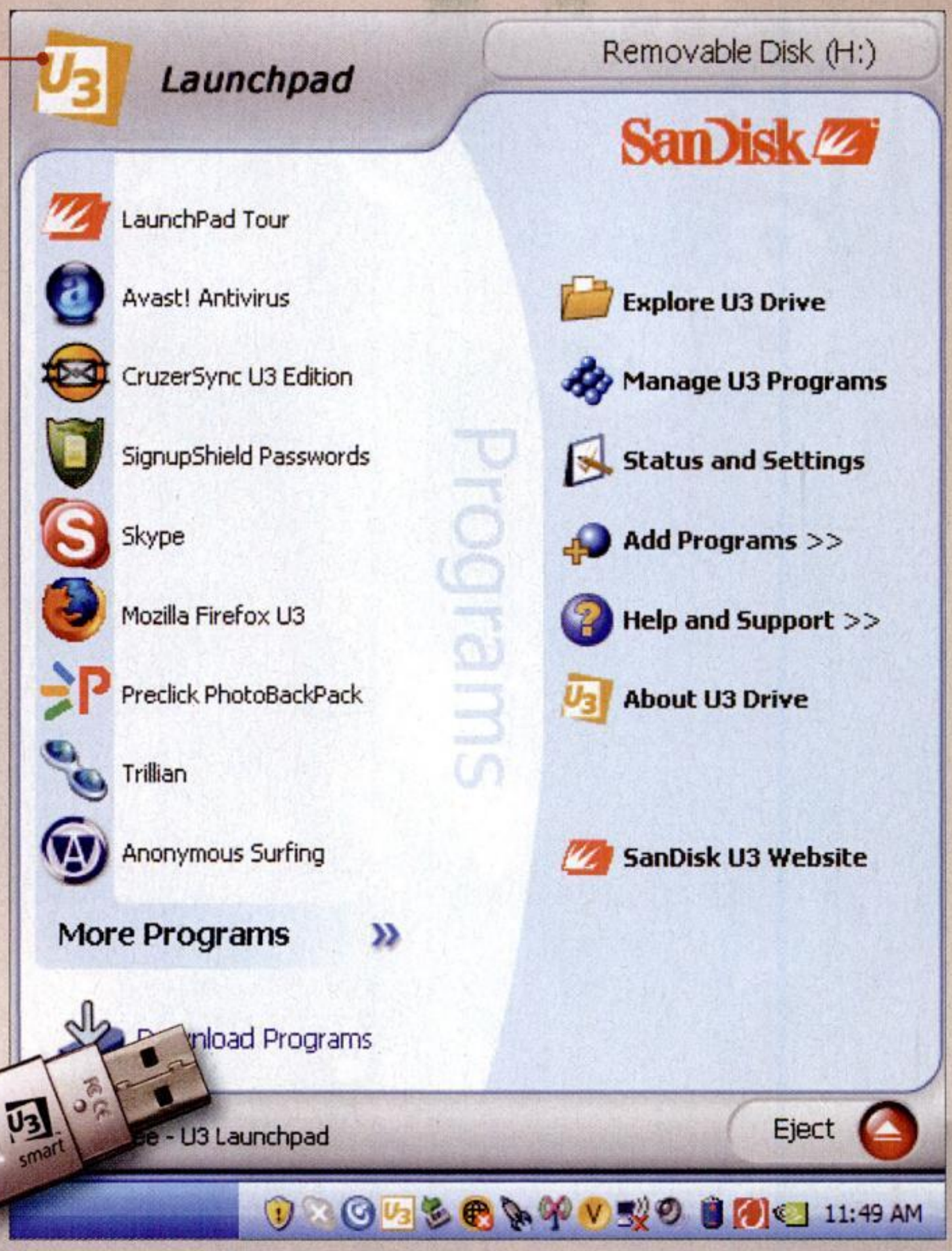
U3
Included with some thumb drives, www.u3.com



round 3

SECURITY
If you're going to carry all your personal data around on a thumb drive, you should definitely secure it from prying eyes. *U3* drives support 128-bit AES encryption, which ought to prevent the average Joe from reading all your email should he find your thumb drive lying on the sidewalk. That's a darn sight better than *Ceedo's* utter lack of encryption—or even simple password protection. At press time, we couldn't even find a *Ceedo* add-on that enables security for the device.
WINNER: U3

round 4

APPLICATION SUPPORT
If it weren't for their ability to run real applications from the USB drive, thumb-drive launchers would be pretty lame. So application selection really makes a difference here. Because it's been around for a couple years, *U3* has established a large library of pre-tuned portable apps, ranging from customized web browsers and instant-messaging programs to games, antivirus utilities, and more. Nascent *Ceedo* has yet to boast as impressive an array of applications, although it does currently offer the standards—including *Word*, *Excel*, and *PowerPoint*. Theoretically, both launchers allow you to shoehorn unsupported Windows apps onto your thumb drive, but we had mixed results using apps not specifically written to work with this type of software.
WINNER: U3

round 5 **FOOTPRINT**
It's all well and good to have access to your apps and data on the go, but it'd be nice if you could avoid leaving a trail of install files and registry entries everywhere you go. *U3* leaves almost no footprint in most cases, as it cleans up all its registry entries each time you eject the drive. *Ceedo*, on the other hand, leaves a mess of entries in your Windows system registry whenever you yank the drive. **WINNER: U3**

And the Winner Is...

While we're always willing to champion the limitless potential of youth, there's something to be said for age and experience. And when it comes to thumb-drive apps, years of accumulated wisdom (and developer support) give *U3* a substantial edge. A massive catalog of readymade software and the ability to detach from a PC without crufting up the rig make the *U3* platform a leaner, meaner launcher for thumb-drive apps. And while we're not blown away by *U3's* simple 128-bit encryption, *Ceedo's* complete lack of data protection is simply unforgivable. MPC

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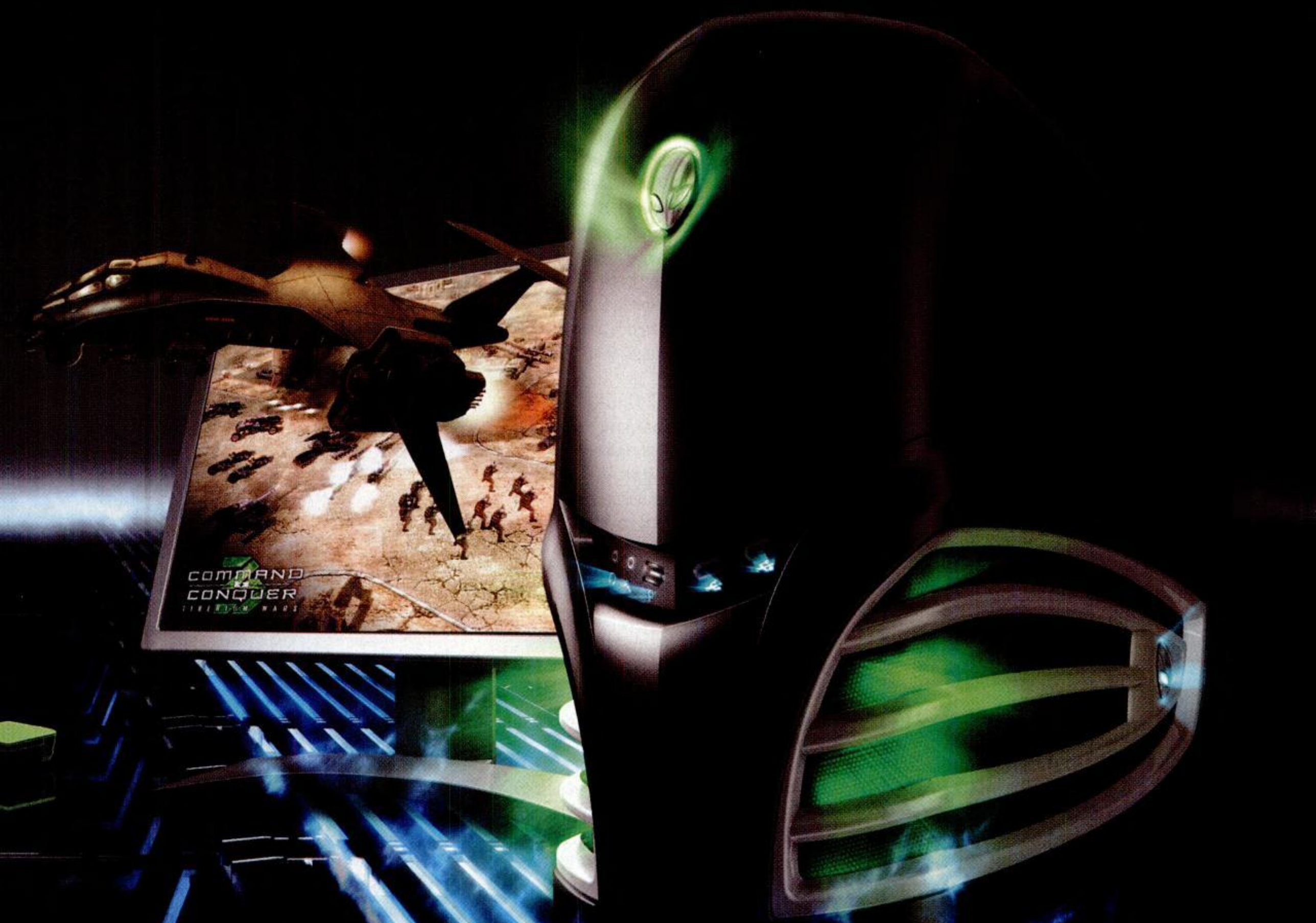

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Tuti, watchdog of the month

DAMN YOU MEDDLING KIDS!

I just got a 200GB hard drive from Western Digital and was really excited when I got the thing home because it was a nice upgrade from the 80GB drive in my computer. I was really bummed, however, when I went to partition the drive and it showed up as a 131GB hard drive. So I was interested to read in the October issue [Quick Start] that Western Digital settled a lawsuit over its mislabeling of drive capacities.

I have Windows XP Professional, a WD2000JB, 784MB of RAM, and a 3000+ Sempron CPU. Please, make like Scooby Doo and find the masked culprit and bring them to justice!

— Josh

Western Digital's settlement has nothing to do with your situation (nor is it old man Wither's fault). WD settled a class-action lawsuit—one that was frivolous, in the Dog's opinion—that concerned the classic disconnect between how Microsoft and hard drive makers define gigabytes. HD makers define 1GB as 1,000,000,000 bytes (a telecom standard, as well) while Microsoft defines 1GB as 1,073,741,824 bytes (a computer science standard.)

Your missing megabyte problem likely lies with the OS or other hardware. Until Service Pack 1 was released, Windows XP could only address 137GB of data on a hard drive. The Dog has a hard time believing that you could be running XP without the service pack, but you should install it if you haven't already. If that doesn't fix the issue, you likely have the hard drive plugged into a motherboard or parallel ATA controller that cannot address capacities beyond 137GB. Remember, your original Windows XP Pro disc without SP1 or SP2 will not let you reinstall and partition the entire hard drive. If you want to start fresh with a clean Windows XP install that can see all of your 200GB, you should build a slipstreamed OS disc using the very excellent *nLite* utility, which is available for free at www.nliteos.com.

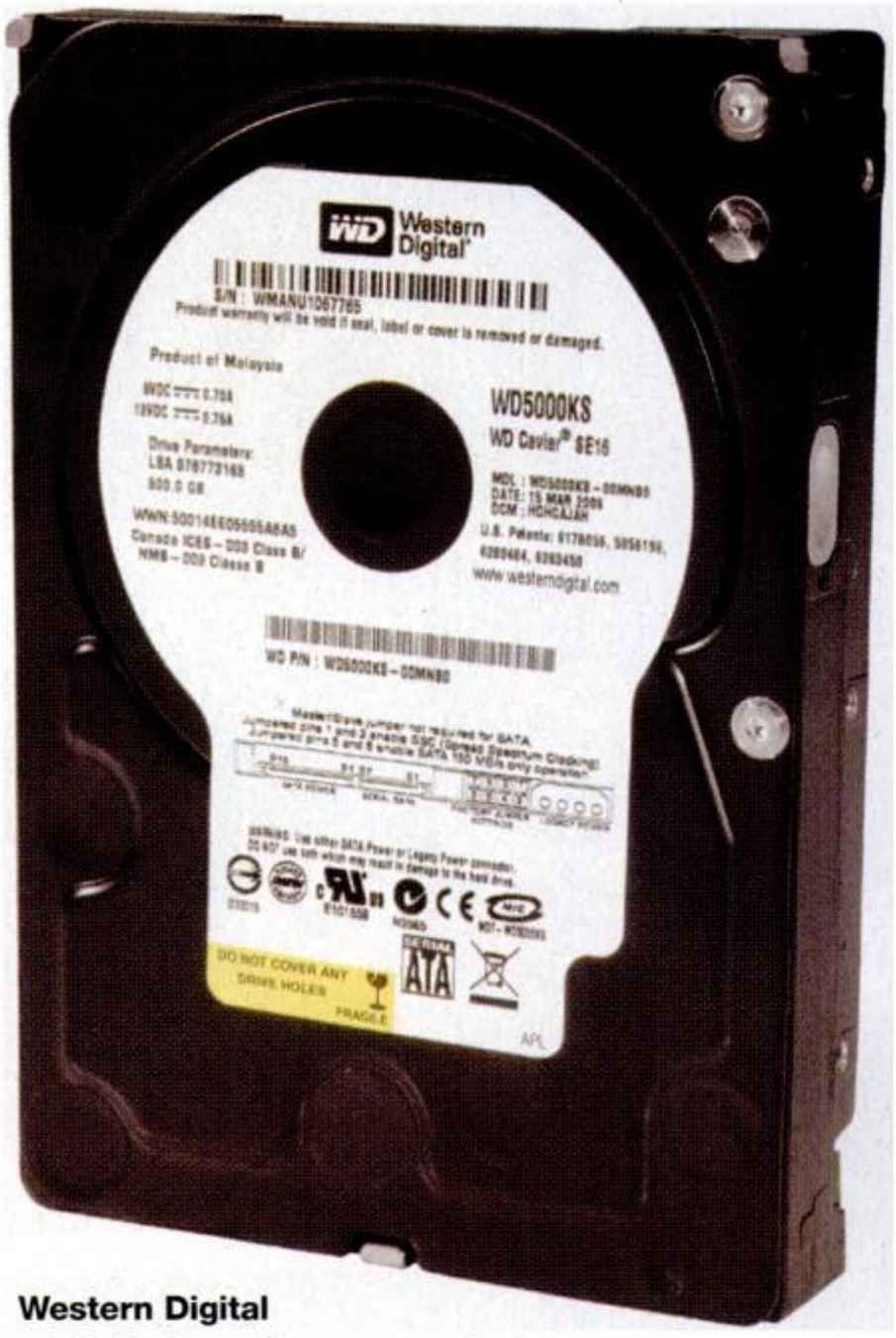
THE GREAT BATTERY RECALL

Years from now, we may all look back on the The Great Sony Battery Recall of 2006 and say we were there, but right now it's a major pain in the tuchis. Following the recall by both Apple and Dell of some 6 million notebook batteries, a raft of other vendors have decided to join in on the fun. Some of the batteries are at risk of overheating and causing a fire. In one incident, an IBM ThinkPad T43 began smoking and sparking and had to be put out with a fire extinguisher, just before the owner of the machine got on a plane, according to the Consumer Product Safety Commission.

Fujitsu is recalling about 287,000 batteries sold in its notebook computers in Japan and abroad. In the table below, we list the products sold in the U.S. that might be affected. If your notebook model, battery part number, and battery lot number appear on this list, you have a winner. If you happen to have a nifty Fujitsu that you picked up on a trip to Japan, or if you need more information on the recall, visit www.fujitsu.com/global/news/pr/n20061017-01.html or call Fujitsu at 800-838-5487 for more information.

On top of that, Toshiba is recalling about 340,000 notebooks using the bad Sony batteries. The bad batteries were included with certain Satellite, Tecra, Portege, and Qosmio versions of Toshiba's notebook PCs. Although they are Sony parts, Toshiba says the batteries are not prone to overheating, fire, or spontaneous explosion like the batteries recalled in Apple, Dell, and IBM notebooks.

Toshiba's recall affects these particular models of notebooks: Portege S100-S113TD, S100-S213TD, S100-S1133, S100-S1132, M300, M400-S933, M400-S4031, M400-ST9113, M400-S4032, M405-S8003, M400; Qosmio G25-AV513, G35-AV660, G35-AV650, G35-AV600; Satellite



Western Digital settled a lawsuit over megabyte mislabeling, but there are other issues that can affect how capacities are reported.

FUJITSU BATTERY RECALLS

NOTEBOOK MODEL	BATTERY PART NUMBER	BATTERY LOT NUMBER
LIFEBOOK P1510, P1510D	CP229720-01	5701 - 6425
LIFEBOOK P1510, P1510D	CP229725-01	5704 - 6421
LIFEBOOK P7120, P7120D	CP234019-01	5915 - 6426
LIFEBOOK P7120, P7120D	CP234003-01	5Y11 - 6424
LIFEBOOK C1320, C1320D, C1321, C1321D	CP255100-01	5624 - 6511
LIFEBOOK C1320, C1320D, C1321, C1321D	CP255108-01	5628 - 5Y15
LIFEBOOK S7020, S7020D, S7021, S7021D, S7025, S7025D	CP267910-01	5919 - 6407
LIFEBOOK S7020, S7020D, S7021, S7021D, S7025, S7025D	CP267915-01	5X04 - 6307
Q2010	CP283030-01	6403 - 6412
T4210	CP293420-01	6508 - 6510

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Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic the Dog on them by writing **watchdog@maximumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

A55-S306, A55-S3061, A55-S3062, A55-S3261, A55-S129, A55-S179, A55-S1791, A55-S1291, R10-S802TD, A55-S1066, A55-S1065, A55-S1064, R10-S820, R10-S804TD, R15-S829, A55-S1063, R10-S613, A55-S106, U205-S5021, U205-S5022, U205-S5012, U205-S5002, R20-ST4113, U200-ST3311, A50S-S1064, U205, U200, U205-S5034, U205-S5044, R25-S3513, R25-S3503, R15-S8222, R15-S822, A55-S3063, A55-S326; and Tecra A2, M4-S115TD, M4-S335, M4-S435, M3-S737TD, M5-S433, M3-S636, M4-S635, S3-S411TD, S3, M3-S316, M3-S336, M4-S535, M4-S515, M7-ST4013, M7, M7-S7311, M7-S7331, M6-EZ6611, M6-ST3412, M5-S5331, M5-ST1412, M5-ST8112, M5, M4-S415, M4-S315, M4, M3-S212TD, M3, M3-S311, M3-S331.

Because of the extensive list of batteries affected, Toshiba has created a utility called *BatteryCheck* that quizzes the battery to see if it's part of the recall. For more information, visit www.csd.toshiba.com/cgibin/tais/su/su_sc_dtlView.jsp?soid=1482876 or call Toshiba directly at 800-457-7777.

Toshiba actually has two recalls in effect right now. A second recall announced in September affects batteries that simply die unexpectedly. Those cells were sold with the following Satellite and Tecra notebooks: Satellite M50-S418TD, M55-S135, M55-S1351, M55-S325, M55-S3251, M55-S2253, M55-S3262, M55-S1352, M55-S2252, M50-S4182TD, M55-S139, M55-S1391, M55-S329, M55-S3291, M55-S3292, M55-S3293, M55-S3294, M50-S5181TD, M55-S141, M55-S1412, M55-S351, M55-S3511, M55-S331, M55-S3311, M55-S3312, M55-S3313, M55-S321, M55-S3314, M55-S3315, M55-S3512, A105-S171, A105-S1711, A105-S271, A105-S2001, A100-ST3211, A100-S2211TD, M105-S322, A105-S2719, A105-S215TD, M50-S5182TD, A100-S8111TD, M100-ST5111, A105-S4014, A105-S4012, A105-S4011, A105-S4004, A105-S4002, A105-S4001, A105-S2111, A105-S2101, A105-S2091, M105-SP381, A100-SP471, M100-ST5211, A100-ST8211, A100-S2311TD, M105-S3014, A105-S4041, A105-S4031, M55-S1001, A105-S4024, A105-S4144, A105-S4104, A105-S4094, A105-S4074, A105-S2121, A105-S4051, M105-S3064, M105-S3051, M105-S3041, M105-S3031, M105-S1011, M105-SP1011, A105-S4174, A105-S4164, M105-S3074, M105-S1031, M105-S1041, A105-S4154, A105-S4034, A105-S4054, M105-S3084, A105-S4274, A105-S4254, A105-S4244, A105-S2224, A105-S2211, A105-S2204, A105-S2201, A105-S2181, A105-S4214, A105-S4334, A105-S4324, A105-S4304, A105-S4294, A105-S2194, A105-S4364, A105-S4344, A105-S4342, A105-S4284, A105-S4204, A105-S4211, A105-S4201, A105-S4092, A105-S2141, A105-S4084, A105-S4184, A105-S4194, M105-S1021, A105-S4102, A105-S4124, A105-S4114, A105-S4132, A105-S4134, A105-S2131, A105-S4064, M105-S3021, M105-S3012, M105-S3011, M105-S3004, M105-S3002, M105-S3001, A105-S4022, A105-S4021, A105-S2081, A105-S2071, A105-S2061, A105-S2051, A105-S2041, A105-S2031, A105-S2021, A105-S2011, A105-S2711, A105-S1014, A105-S1013, A105-S361, A105-S3611, A105-S1712, A105-S2714, A105-S2715, A105-S2712, A105-S2713, A105-S2716, A105-S2717, A105-S101, A105-S1012; and Tecra A6-S513, A6-EZ6311, A6-EZ6312, A6-ST3512, A7-S612, A6-S713, A7-ST5112, A6-ST3112, A6, A7-S712.

The same utility mentioned above will verify whether the battery in any of these notebooks is affected.

Not to be left out, Lenovo and IBM are recalling about 168,500 batteries sold in ThinkPad notebooks in the U.S. and an additional 357,500 sold outside the U.S. The batteries use Sony cells and are at risk of catching fire. The models in question are the T43, T43p, T60, and T60p; R51e, R52, R60, and R60e; and X60 and X60s. To check your battery, power down the notebook, unplug it, and remove the battery. The battery will have an FRU part number and ASM part number. If the numbers appear in the table below, you have a bad battery. Lenovo recommends that you stop using the notebook with the bad battery and contact the company at 800-426-7378 or www.lenovo.com/batteryprogram for more information. Lenovo also has an applet available at the website that you can run to check your battery's status without removing it. MPC

THINKPAD BATTERY RECALLS

ASM P/N	FRU P/N
92P1072	92P1073
92P1088	92P1089
92P1142	92P1141
92P1170	92P1169 or 93P5028
92P1174	92P1173 or 93P5030

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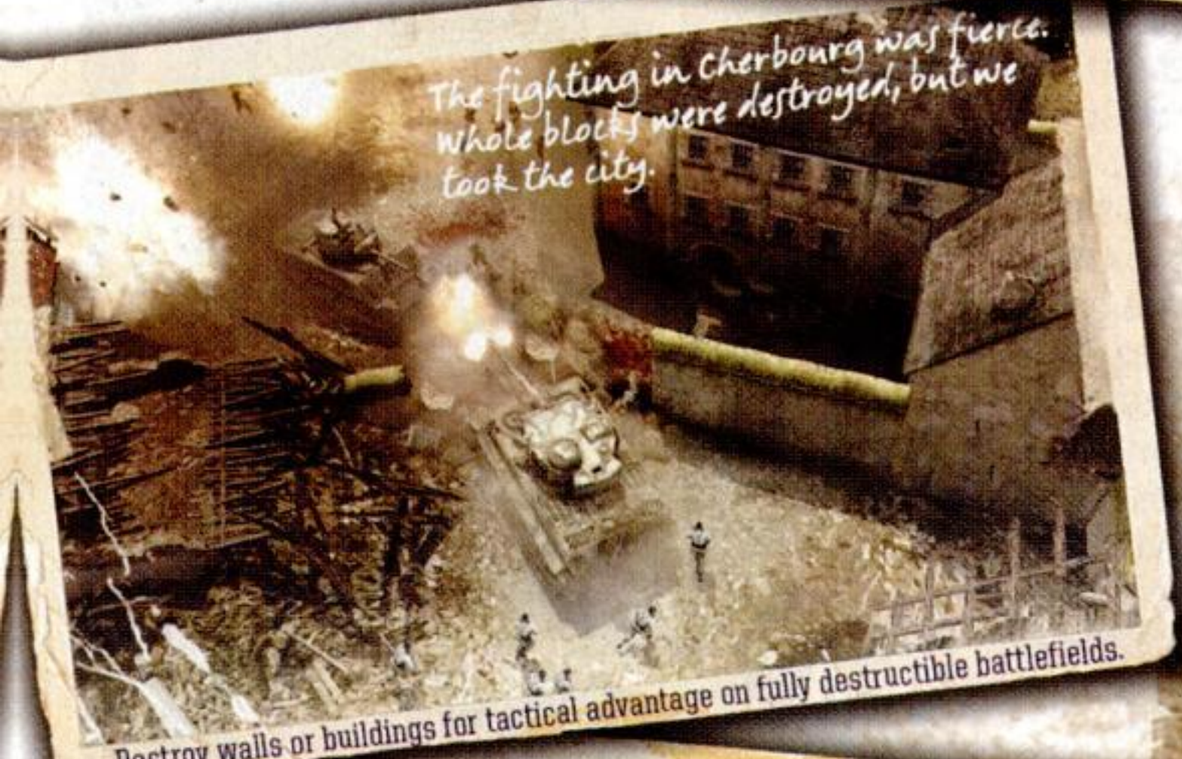
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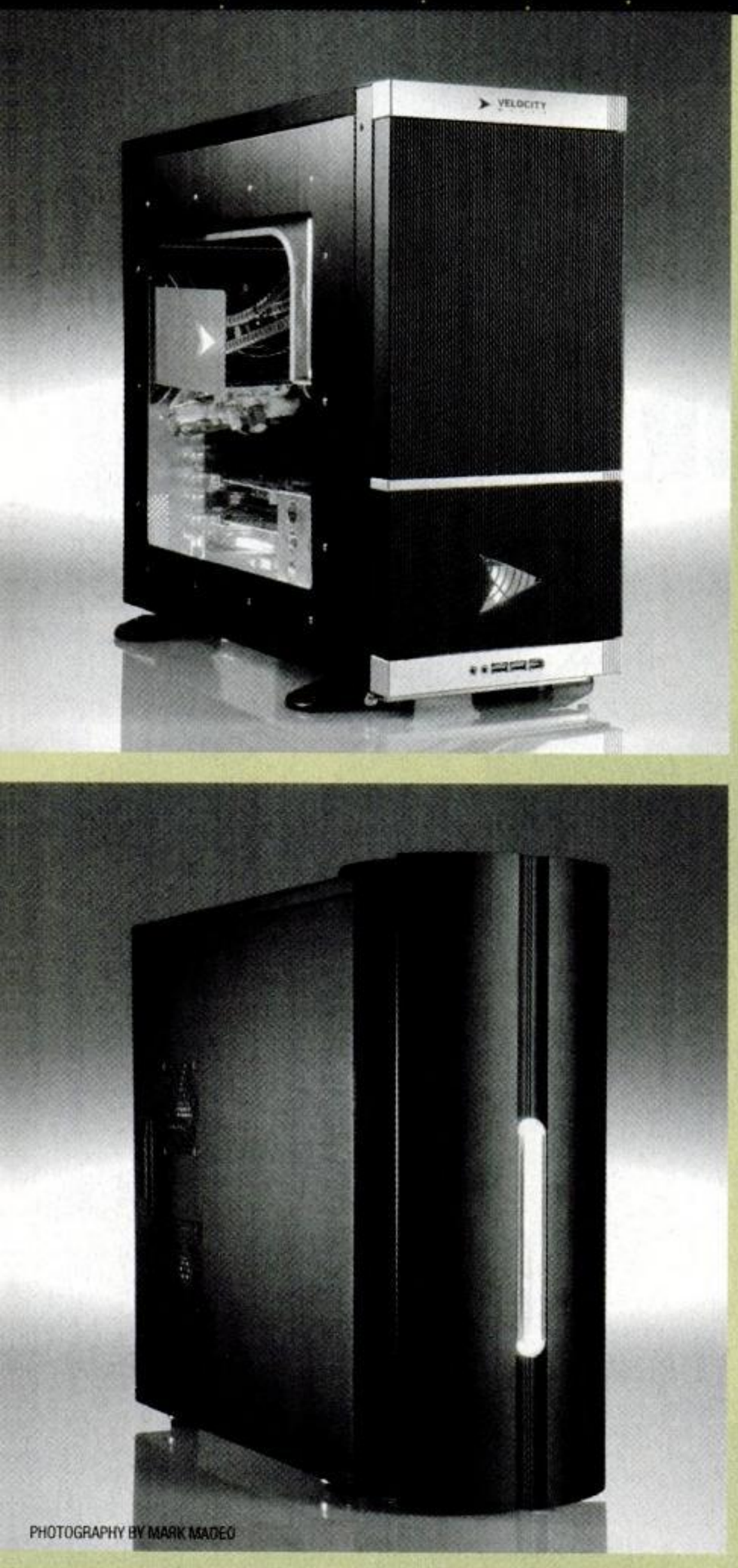

PHOTOGRAPHY BY MARK MADEO

Can these seven midrange PCs restore dignity to the common man's gaming experience?

BY THE MAXIMUM PC STAFF

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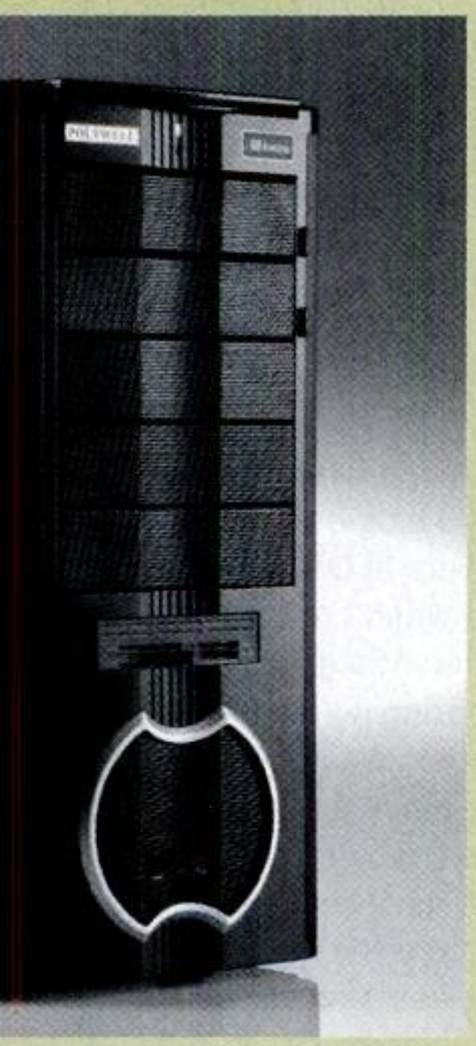
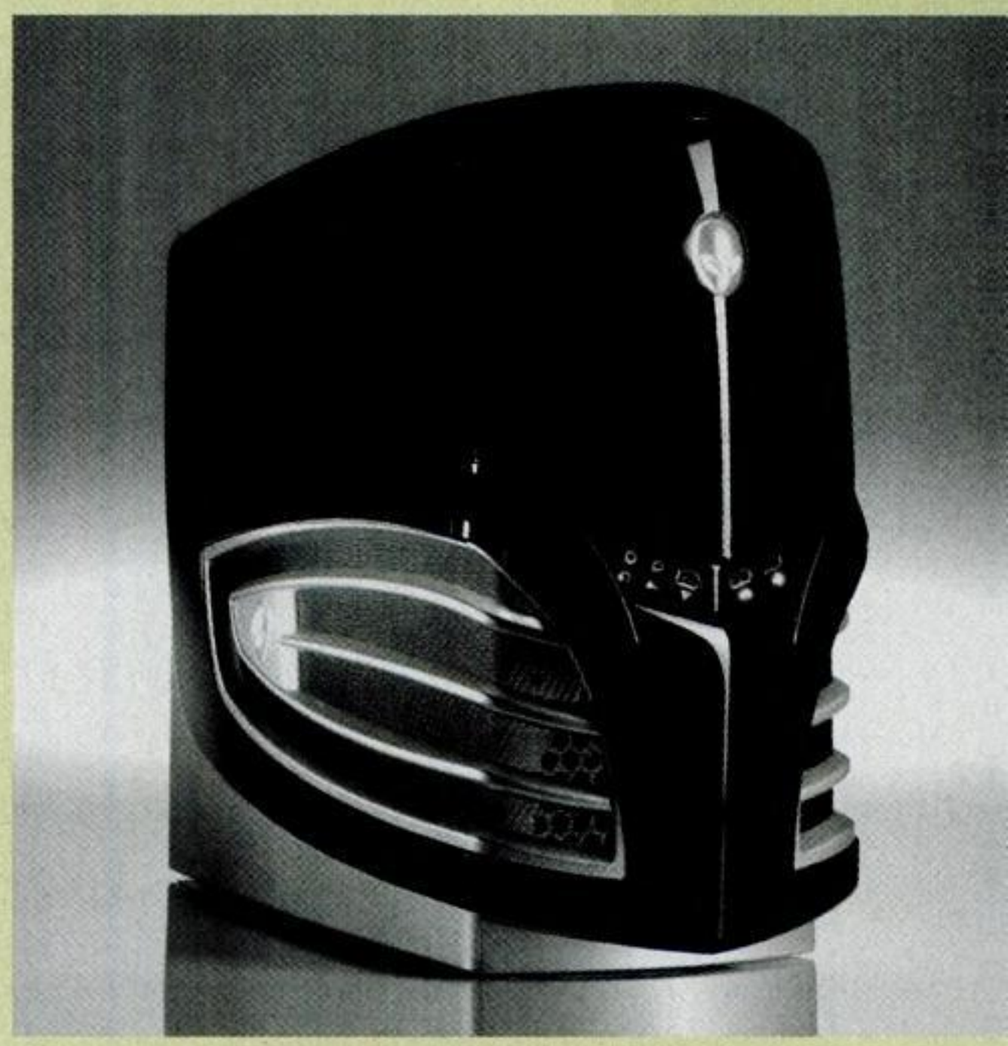




Anyone can build a great gaming rig with an unlimited budget, but what if there's a hard cap on the cubits that can be spent? We posed just such a challenge to seven leading system vendors, asking them to build the fastest gaming machines they could muster for a truly affordable $2,500.

Custom paint jobs? Quad videocards? Terabytes of storage? Not here, buddy. Those high-end luxuries go out the window, and vendors are forced to make tough choices—robbing the motherboard to pay the videocard, so to speak. Indeed, in many ways, building a $2,500 config is more difficult than building the ultimate gaming rig, where you just grab the fastest parts available. In this challenge, vendors had to really weigh the cost and benefits of every single part. Core 2 or Athlon 64? If you run the Core 2 Extreme, can you afford dual videocards? Does RAID break the bank? Does a soundcard earn its keep? Is 2GB of RAM really necessary?

These are the questions we expected the vendors to gnash their teeth over as they tried to outfox their competitors. No matter what, we had modest expectations of their cash-strapped creations. And yet this cohort contains some pleasantly surprising configs. Read on to find out just how much computer you can get for $2,500.

The system's reviewed in this roundup will be available at each vendor's website beginning November 1, at the published price.

Copyrighted material

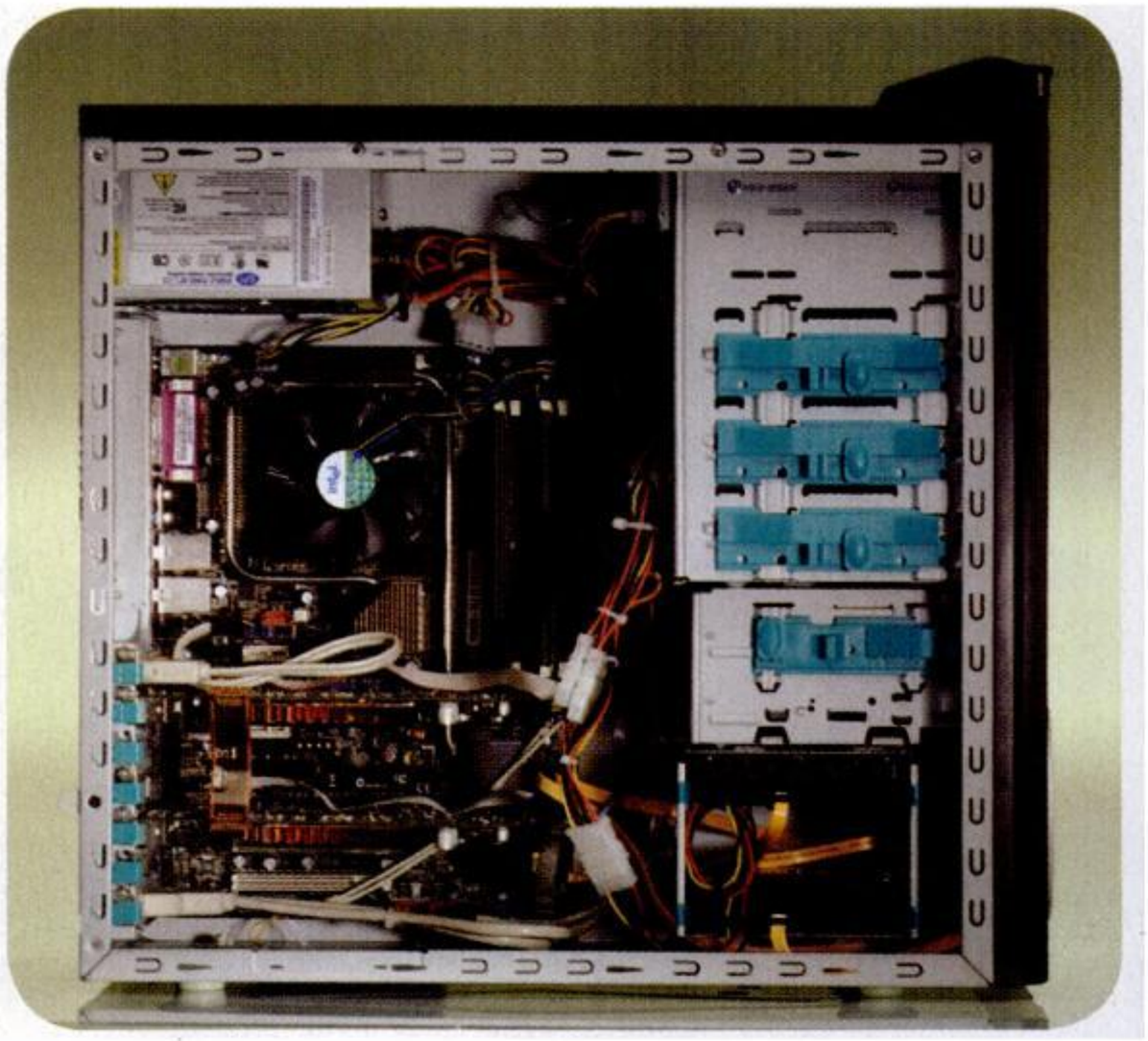
Polywell Poly 976SLI

nForce and GeForce join, er, forces

We've always liked Polywell's attitude about systems: professional and relaxed. While some vendors tweak their PCs until the last possible second—swapping out hardware and updating drivers until the bitter end—Polywell delivers its systems with a Cal Ripken-like reliability, which says volumes about the company and its products.

The Poly 976SLI featured here, for example, arrived a full two weeks before the deadline for this roundup. You might think that those two weeks would translate into old, moldy hardware, but Polywell's config is respectable and stable.

The CPU is Intel's $500 Core 2 Duo E6700, which gets you 80 percent the performance of the Core 2 Extreme X6800 at half the price. Polywell teams the CPU with an nForce4 chipset and a pair of Nvidia's midrange GeForce 7950 GT cards in SLI.



A pair of GeForce 7950 GT cards in SLI hold their own against an onslaught of CrossFire cards.

Don't rub your eyes, the Poly 976SLI has 22-inch rims and spinners.

If you're wondering why Polywell didn't go for the more cutting-edge, faster X1950 XTX CrossFire cards, as seen in three of the other systems here, consider that all three of those systems arrived in our Lab with "issues."

Polywell's rig rolls gansta-style, with an all-black enclosure that boasts a 9-inch fan embedded in the side—surely the PC equivalent of spinning rims. Fortunately, the mammoth fan is quiet, thanks to its low RPM, and a switch lets you reverse the flow of air or shut it off entirely. (We ran our tests with the fan set to suck air in from the outside.) The enclosure is also unique in featuring a front-mounted eSATA port.

Although the 976SLI is the very definition of midrange, Polywell does slip in a few tricks. While the majority of vendors here went with a single 7,200rpm drive for storage, the Poly 976SLI features a pair of 150GB Raptors in RAID 0. That strategy paid dividends in our *Photoshop* test, with Polywell nabbing the best score, beating out even the highly overclocked Overdrive system.

This rig's dual 7950 GT cards are no slouches in our game tests, either. The Poly 976SLI didn't ace any of the gaming benchmarks, but it certainly held its own. It was the third-fastest rig in our *FEAR 1.07* test and finished just a few frames behind the Overdrive in *3DMark's* Deep Freeze. Still, those $300 single-slotters couldn't outrun the others in *Quake 4* and *Company of Heroes*. It wasn't the slowest in those games—that title goes to Alienware—but it was bringing up the rear.

That made us wonder: Was Polywell's strategy to forego first-place aspirations and the stiff resistance it would face from boutique vendors such as Overdrive, and instead attempt to capture the middle ground. If so, the company succeeded in its goals. The machine places a solid third in our roundup behind the overclocked Overdrive system and the well-spec'd, but slightly wonky CyberPower rig. Certainly everybody in the Olympics wants a gold or silver medal, but to stand up with this crowd of competitors and get a bronze is an achievement in its own right.

POLY 976SLI
$2,500, www.polywell.com
7

HOW POLYWELL SPENT $2,500

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EPP Enhanced Performance Profiles

Cool Performance

HOW CORSAIR MAINTAINS

TECHNOLOGY LEADERSHIP

Here's the latest in Corsair's ten year heritage of innovation in performance memory: we've redefined memory heat sink technology. And the result is unprecedented performance and reliability. When we ran a preview module through system benchmarks at COMPUTEX, an overclocked DHX module with our optional airflow fan was able to hit a heart-stopping 1250MHz (PC-10,000) while maintaining cool, reliable performance.

Protect Components While You Push Performance

Pushing performance specs generates heat, and that can compromise reliability and component life. The advanced cooling ability of DHX heat sinks keeps your memory safe and reliable even as you push it to the limit. Under the name XMS2 Dominator, this DHX technology will be showing up on both Corsair parts designed for extreme overclocking and on memory designed for performance computing and gaming.

Also Featuring Enhanced Performance Profiles (EPP)

As with all new Corsair performance memory, XMS2 Dominator modules feature EPP, the new open standard for the Serial Presence Detect (SPD) jointly developed by NVIDIA and Corsair. EPP simplifies overclocking for beginners and provides unparalleled control for experts.

AIRFLOW

An optional fan (not shown) provides even more cooling and protection.

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Velocity Micro Gamers' Edge PCX

Pretty, but slow and unstable

Velocity Micro has a reputation for building tight systems that outperform their price tags, so we were really excited to see what the company would submit to our $2,500 roundup. Unfortunately, while Velocity's overclocked Core 2 E6700-powered rig was beautifully appointed, it just wouldn't run at its shipped clock speeds.

Velocity made a couple of very interesting component choices for its Gamers' Edge PCX. Instead of a more expensive nForce 590 board, the PCX sports a prototype nForce 570 motherboard. The 570 board offers a pair of x8 PCI Express slots, and it dispenses with the automatic PCI Express overclocking feature in the 590 offering. Like Polywell, Velocity dropped a pair of GeForce 7950 GT boards running in SLI into the PCI-E slots. We appreciate that Velocity equipped the PCX with a spacious 320GB Western Digital drive, but we lament the absence of a soundcard.

As for the benchmarks: Anytime we get an unstable system in for review, its verdict is going to suffer. In order to get any of our tests to run on this rig, we had to clock the front-side bus down from 1,195MHz to the default 1,066MHz, which dropped the CPU clock speed from 3GHz to 2.66GHz. At its stock clock speeds the rig ran stable, with middle-of-the-road performance in both games and applications, and nary an exciting or redeeming feature to sauce up an otherwise bland performance package.

Velocity gains an aesthetic edge with its custom Lian-Li enclosure and near-Voodoo-quality wiring job, and the Peltier-powered water-cooling setup adds a splash of pizzazz, although it chills only the CPU. But good looks can't mask the PCX's instability issues and middling performance.

The custom Lian-Li case and active water-cooling setup make a fine first impression—too bad performance falters.

GAMERS' EDGE PCX
$2,500, www.velocitymicro.com
5

HOW VELOCITY MICRO SPENT $2,500

Alienware Area-51 5500

It never pays to bring a knife to a gun fight

We expected Alienware—the largest system vendor in this roundup—to leverage its buying power to offer the best value for the buck. But based on the exceedingly underpowered system we received, we can only conclude that the company severely underestimated the competition.

Sporting an Intel Core 2 Duo E6700 CPU running at its stock clocks, an Intel D975XBX motherboard, and a lone Radeon X1950 XTX, this machine is simply outclassed by every other system here.

Look at the benchmark scores. The Area-51 5500 chalks up the lowest marks in almost every test, performing especially poorly in the gaming benchmarks. Mind you, all the vendors were specifically told that this was a gaming roundup, and that gaming performance was paramount. A single-GPU config is plain inexcusable.

Alienware made some other goofy parts choices. The included water-cooling rig just doesn't make sense. A self-contained internal water-cooler cries out for overclocking, but this CPU runs at stock speeds. Sure, the machine runs fairly quiet, but the cooling scheme seems overkill, especially given the meager amount of hardware populating the case. We do like the wireless fan on the case door—it draws power from a contact panel built into the case. Unfortunately, one of the front-mounted fans was knocked loose during shipping—disappointing.

Alienware's new mid-size case has the company's signature stylishness and sports a respectable wiring job. Too bad the configuration is so uninspired.

Alienware's mid-tower case offers plenty of room for kick-ass hardware—so where is it?

AREA-51 5500
$2,500, www.alienware.com
6

HOW ALIENWARE SPENT $2,500

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AS REAL AS IT GETS

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(ACTUAL GAME SCREEN SHOT)

Microsoft game studios

Games for Windows

Play to win with intel Core 2

EVERYONE E CONTENT RATED BY ESRB

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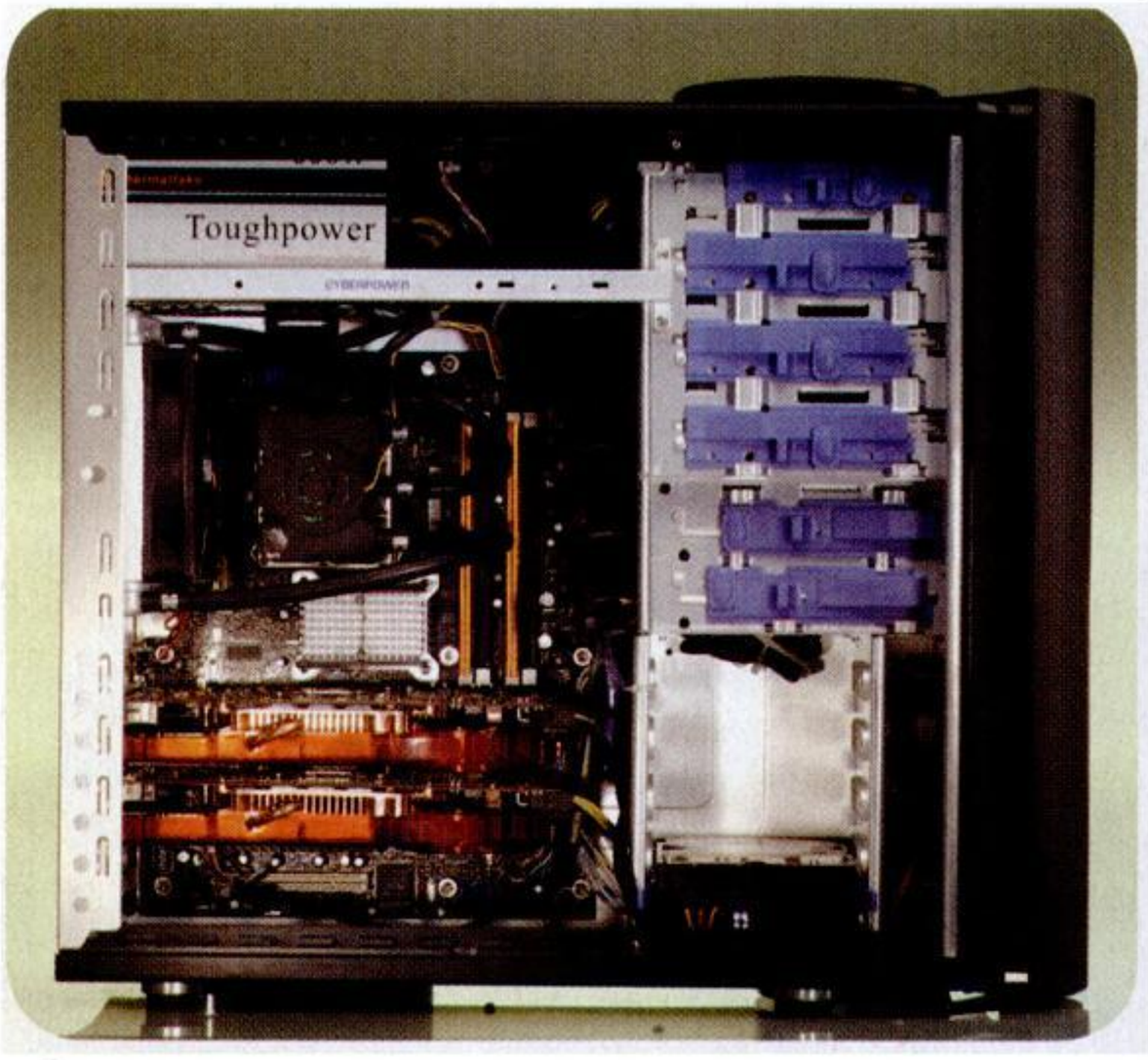
CyberPower Gamer Infinity CrossFire

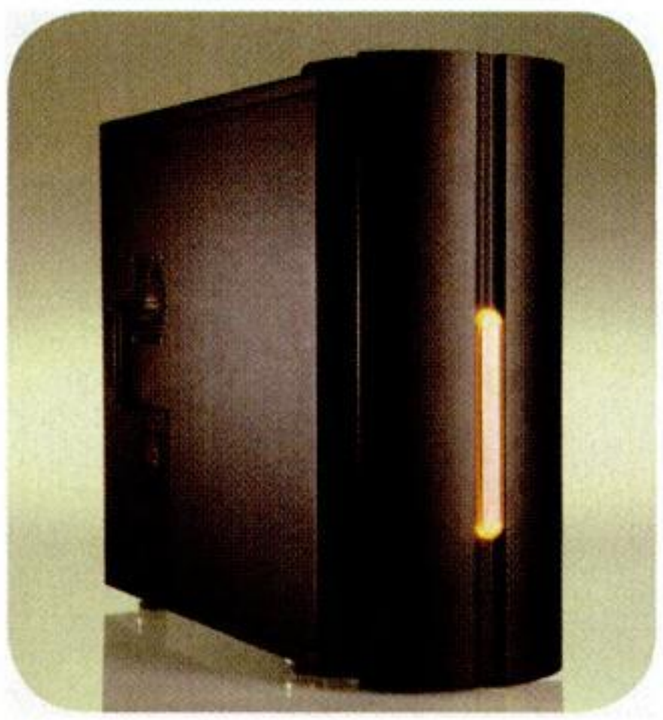
Jam-packed with great hardware; dogged by small glitches



An ATI Radeon X1950 XTX CrossFire combo pumped out killer frame rates in our gaming benchmarks.

When the CyberPower Gamer Infinity CrossFire tumbled off the truck at our loading dock, we immediately thought two things: 1) That's an insanely long name for a PC, and 2) There's no way this thing can sell for $2,500. Then we fired it up.

On paper, the CyberPower is a monstrous machine for the money. A 2.93GHz Intel Core 2 Extreme X6800 sits atop an Intel D975XBX mobo, backed by 2GB of DDR2/800 RAM, with a pair of 512MB ATI Radeon X1950 XTXs in CrossFire mode. With specs like those, we half-expected to see this system tear up the benchmarks and give higher-end gaming PCs a run for their money. Heck, we were even willing to forgive its wildly unattractive CoolerMaster Mystique 632 enclosure. But this little piggy came out of its box with a few nagging glitches—including a persistent and deeply rooted Windows system registry error that commanded attention every time we booted the machine—that plagued the rig throughout our bench tests.



That freakish, bat-winged case may not look like much, but inside lurks this little monster's Core 2 Extreme X6800 CPU.

At first blush, the specs handily outweighed the bugs, as CyberPower's CrossFire GPU team consistently punched out frame rates in the mid-90s on our *FEAR* benchmark. But the more we tested, the less consistent the results, eventually plummeting to a far less noteworthy (but still respectable) 74fps, and eventually bottoming out at 49fps. Fortunately, the system retained its teeth in our other benchmarks, racking up 137.8fps in *Quake 4* and leading the pack with a commanding 42.9fps in the *3DMark06* Deep Freeze test.

The Gamer Infinity CrossFire did just as well in applications performance thanks to the X6800 CPU, losing to only the highly overclocked Overdrive in our *Premiere* and *Nero Recode 2* tests. The clock speeds, however, couldn't out-muscle the hard drive dependency of our *Photoshop* test, and the CyberPower finished behind the RAID-equipped machines.

For such a feature-packed box, this system lacks those little touches that separate the good machines from the truly great. Where the folks at Velocity Micro and Alienware took the time to add aesthetic touches such as neatly gathered cabling, the CyberPower rig is clearly strapped with a mess of zip ties. Of course, given that the hardware in this system ate almost the entire $2,500 budget, the company probably couldn't afford the few extra hours of labor required to tidy up the interior.

Even with its flaws, however, the CyberPower is a pretty mean machine for the money, even rivaling some far pricier systems in its *Quake 4* and *3DMark06* performance. But when you're spending your hard-earned ducats—even just 2,500 of your ducats—on a gaming rig, you want it to perform flawlessly. So even though this system outran the Overdrive in most of the gaming tests, its flaky performance, quick-and-dirty assembly, and fugly case cost it the top spot.

INFINITY CROSSFIRE
$2,500, www.cyberpowerpc.com
8

HOW CYBERPOWER SPENT $2,500

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Introducing Antec's NINE HUNDRED advanced gaming case. With all of its high performance features, like a massive 200mm cooling fan and nine ventilated drive bays, you'll have an unfair advantage over your competition (just the way it ought to be). For more information about the Antec's Nine Hundred visit www.antec.com.

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The Power of You

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Systemax Sabre G67

Good component choices undone by sloppy build quality

Systemax seems to be missing two letters from its alphabet: Q and A—as in quality assurance. We came to this conclusion when none of the system's six USB ports would recognize a mouse. Each port provided power, and Windows emitted its two-tone device-recognition signal, but the pointer wouldn't budge.

The problem wasn't limited to mice. None of the USB ports would mount any of the USB hard drives we use to install our benchmark applications, either. After extensive but fruitless troubleshooting, we wound up plugging in an eSATA hard drive to install our benchmarks, and we used a PS/2 mouse to run them. If Systemax will ship a system in such a state for review, we have to wonder about the quality of product it ships to customers.

While we're on the topic of build quality, the tower case Systemax selected looked as though it was painted in our cousin Manny's basement: The paint on the steel case felt decidedly grainy, and the paint job on the plastic bezel was not only sloppy but also a shade lighter.

Systemax made generally solid component choices, including two stock-clocked ATI Radeon X1950 XTX videocards in CrossFire, a pair of Western Digital 74GB Raptors in RAID 0 (supplemented by a 320GB Seagate Barracuda 7200.10 backup drive), and a Creative Labs Sound Blaster X-Fi, but its best scores were second-place finishes in two benchmarks: *Quake 4* and *Photoshop* (and we couldn't coax the system to run *3DMark06* at all).

We realize $2,500 is a tight budget to work with, but it's certainly not chump change. We'd have been happier if Systemax had spent some of its scratch to make sure we received a trouble-free computer.

The Sabre G67 has an X-Fi soundcard, but Systemax neglected to connect it to the case's front-panel headphone jack.

SABRE G67
$2,500, www.systemax.com
5

HOW SYSTEMAX SPENT $2,500

Gateway FX530XG

A surprisingly kludgey effort from this mainstream manufacturer

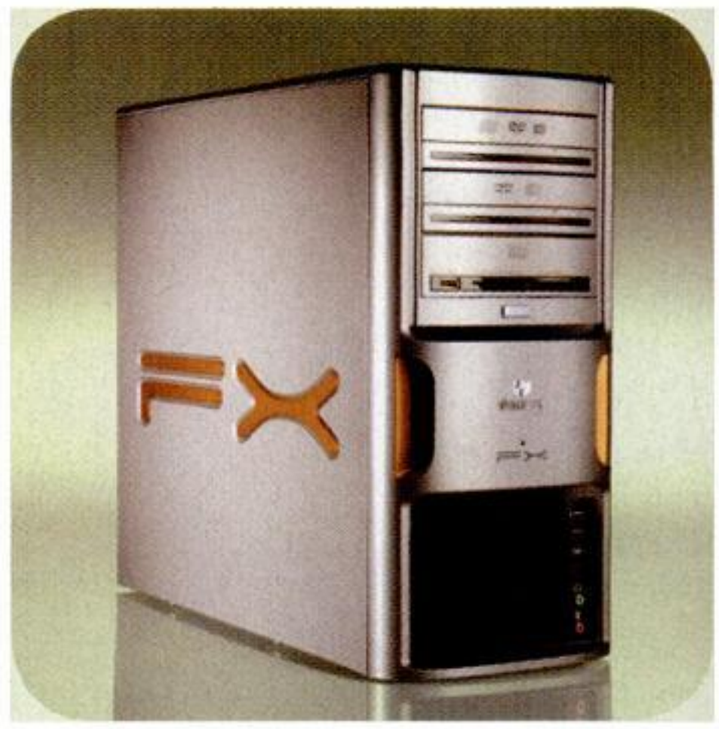
Gateway jumped on the BTX bandwagon early, and it remains sufficiently enamored with the formfactor to use it for this mainstream gaming PC. Frankly, we don't understand why.

BTX's primary benefit—improved airflow that accommodates slower, quieter cooling fans—isn't all that significant now that Intel's cool Core 2 Duo is on the scene. And the BTX case that Gateway chose is so compact that it won't accommodate a pair of ATI's X1950 XTX cards—at least not with their new super-quiet heatsink/fan combos. Gateway's solution was to retrofit one of the two videocards with the hair-dryer cooler from the older X1900 XTX. What's worse, the fan never spins down from maximum—nullifying one of BTX's biggest advantages and easily rendering this box the noisiest of the lot.

But Gateway deserves credit for detecting a video-card driver problem that affected one of our benchmark tests, *Company of Heroes*. Gateway's product manager brought the situation to ATI's attention before shipping the system and obtained a new driver that fixes the anomaly; Gateway was the only vendor that provided us with these new drivers.

Aside from a virtual tie for first place in *3DMark06's* Deep Freeze benchmark, however, the Gateway significantly underperformed the rest of the field. Alienware's single-videocard Area-51 5500 was the only machine to deliver slower performance with *Quake 4*, and the Gateway came in a full 13 frames per second behind the GeForce 7950 GX2-equipped Overdrive Core2.GX2 playing *FEAR*.

Gateway delivers some choice components in its $2,500 box; unfortunately, the whole doesn't quite equal the sum of its parts.



Opinions of the FX530XG's case were mixed: Everyone dug the tool-free design, but some editors thought the lines were too 1980s retro.

FX530XG
$2,500, www.gateway.com
6

HOW GATEWAY SPENT $2,500

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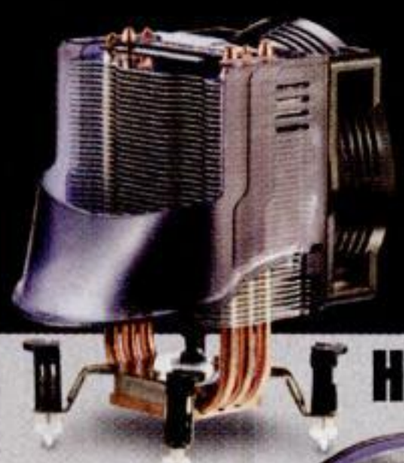

Hyper TX

Mars

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Overdrive Core2.GX2

Overdriven and overclocked Core 2 puts this PC at the top

Our last foray with an Overdrive PC left us believing that these guys are technically proficient, exceedingly hardcore, and just plain nuts. The Core2.GX2 only reaffirms that opinion. The 2.4GHz Core 2 Duo E6600 is easily the lowest-clocked CPU of all the systems in this roundup, but Overdrive manages to goose the 2.4GHz by 1GHz—using air cooling, no less. We're talking a *stock* heatsink.

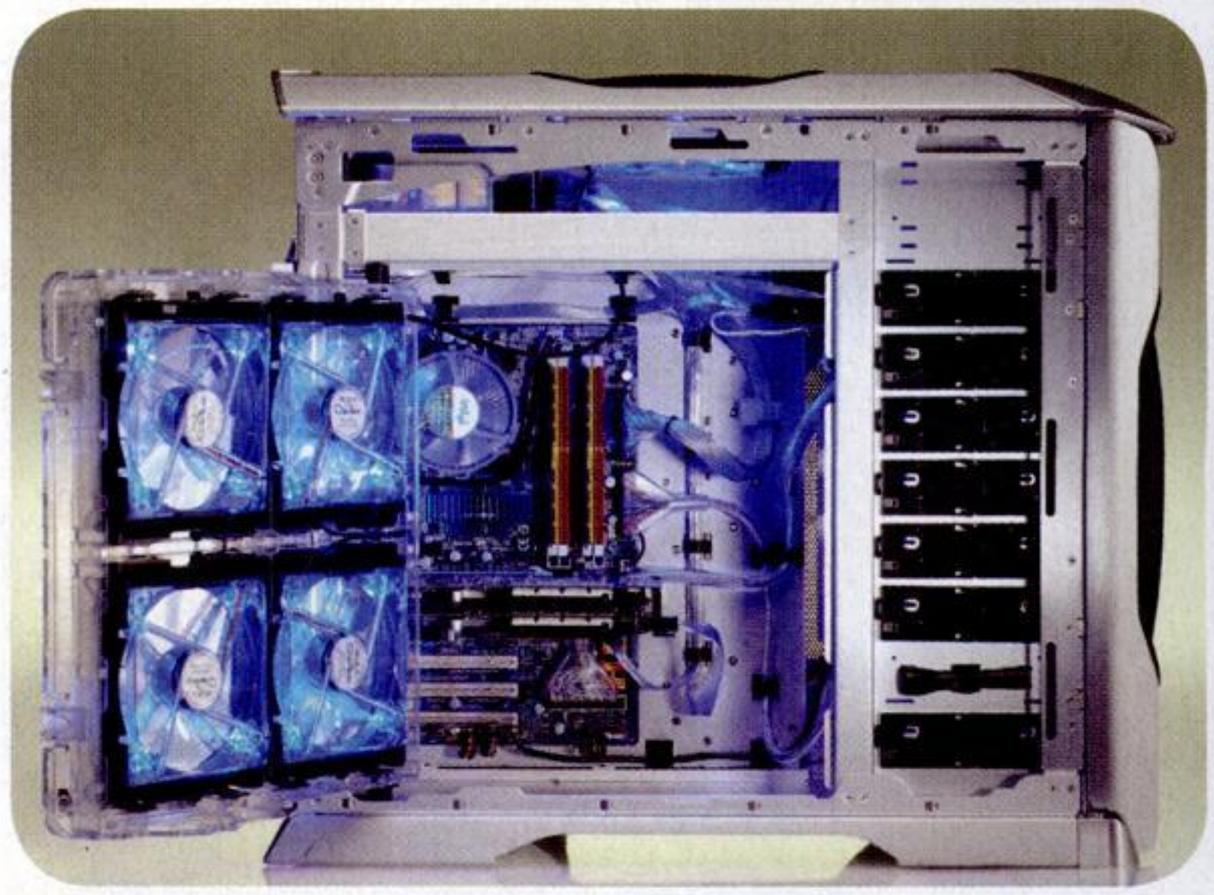
Some vendors can't manage that kind of clock boost with water or phase-change cooling. But that's what we've come to expect from this company that clearly loves to tinker with hardware.

Still, we're skeptical that tinkering alone is the reason behind the dramatic overclock.

The burly CMStacker 830 case can make any PC seem macho.

Our guess is that Overdrive is in the habit of binning CPUs, looking for chips that can be pushed to extremes. For every 3.46GHz Core 2 Duo the company turns out, it probably had to buy four others that don't make the cut.

This strategy isn't cheap and the trade-offs show up in the config. While some of the other vendors here give you two Radeon X1950 XTX cards, an X-Fi soundcard, 150GB Raptors, and even RAID, there's nothing like that here. In fact, open the cavernous Cooler Master CMStacker 830 and you can almost hear an echo bounce off the lonely 250GB Seagate SATA drive, Sony DVD burner, and single GeForce 7950 GX2. Hell, we haven't seen this many free PCI slots since 1998! Although, to be fair, we must point out that the 7950 GX2 pulls double duty via its two GPUs—Overdrive pushes the card from the stock 500MHz/1,200MHz DDR speeds to 600MHz /1,550MHz.



Amazingly, Overdrive hit 3.46GHz with its Core 2 Duo chip without resorting to water-cooling.

We certainly can't ding the Core2.GX2 on performance. In applications, the 3.46GHz Core 2 Duo lays down the law—none of the other six players even come close to this rig's numbers. Only in *Photoshop CS2* does the Core2.GX2 take a backseat, losing to the Gateway and Polywell rigs. Why? Our lengthy *Photoshop CS2* action script hits the hard drive as well as the CPU, so it's not surprising that the Core2.GX2's single 250GB Seagate drive loses to the two systems that sport dual 10,000rpm Raptor 150 drives.

In gaming, the Core2.GX2 does well, but Overdrive's gamble wasn't a totally winning strategy. The company bet that the OC'd GX2 would trample any GeForce 7950 GT SLI configuration in our midrange roundup, and it does. But the company didn't anticipate ATI's Radeon X1950 XTX CrossFire cards, which manage to wrangle the top scores in *Company of Heroes*, *Quake 4,* and *3DMark06*'s Deep Freeze test. The Core2.GX2 comes back in *FEAR 1.07*, however. But because this roundup isn't about applications and being No. 2, Overdrive's machine was looking like second fiddle to Cyber Power's rig until the latter's wonky behavior gave us the willies.

In the end, we have to hand it to the Core2.GX2. As nutty-overclocked as it is, the machine withstood a 24-hour burn-in test without a hitch and its benchmarking performance was free of hiccups.

We're not sure how happy the Overdrive folks will be about backing in to a victory, but, hey, a win is a win. And consumers come out ahead because the company assures us it will be able to ship, and warranty, systems with the same configuration and clock speeds.

CORE2.GX2
$2,500, www.overdrivepc.com
9

HOW OVERDRIVE SPENT $2,500

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Heroes of Azeroth Unite!

Arcanite Reaper
7
Two-Handed Weapon
Are We There, Yeti?
Quest
Pay 6 to complete this quest.
Reward: Put three Mechanical Yeti ally tokens with 1 ATK and 1 health into play.
"Now, I sent some mail to my friends already, telling them that I have a surprise for them. This is where you come in!" — Umi Rumplesnicker
AZEROTH 346/351
Leeroy Jenkins
Paladin
nters play, exhaust all other allies in
eady during your next ready step.
s!" → Leeroy has ferocity
Let's do this!"
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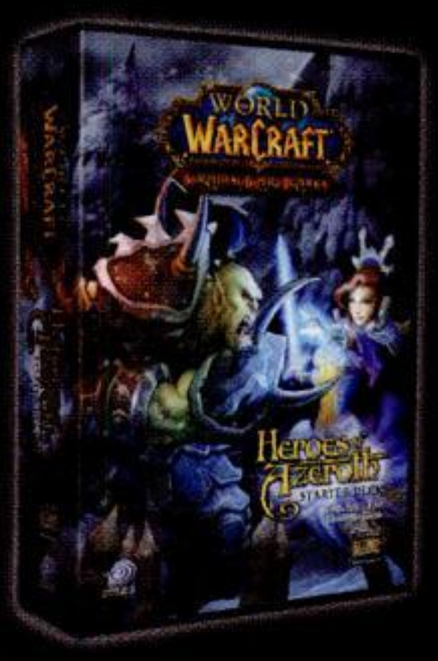

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UPPER DECK

Speeds and Feeds

We break it all down: what our benchmarks measure and how each system performed—plus a handy comparative chart of all the hardware that makes each system tick

To judge the respective merits of the Magnificent Seven, we turned to four games and three applications. Yes, this is a gaming roundup, but few people use their computer strictly for games—everyone has to edit a photo or encode a video once in a while, so application performance does matter. We ran all the tests at 1600x1200 resolution—a compromise between the 1280x1024 native resolution of standard 19-inch panels and the 1920x1200 resolution of the increasingly popular 24-inch screens.

APPLICATIONS

The three applications we chose reflect some of the more demanding tasks that users today face: video editing, digital photo editing, and media encoding. For video editing (and encoding, to an extent), we used our standard Adobe *Premiere Pro 2.0* test, which takes an HDV-resolution file, adds a ton of transitions and video overlays, and outputs the result to Windows Media. Ahead's new *Nero 7.5* and the included *Recode 2.0* app are also good measures of a system's video-encoding chops. The latest revision of *Recode* supports H.264 encoding, so we take a feature film's VOB from the local hard drive and encode it for iPod video resolutions.

Both *Recode 2.0* and *Premiere Pro 2.0* lean heavily on the CPU, so that part has a huge bearing on performance. The same goes for our *Photoshop CS2* test, which takes a digital RAW file and performs dozens of filters on it. *Photoshop CS2*, surprisingly, is also very disk dependent, which explains why the RAID 0 rigs enjoyed a clear advantage over the single-drive machines in this test.

GAMING

As gaming is the primary focus of this roundup, these tests do hold more weight in our final assessment of the rigs. *FEAR* continues to be an utter GPU pig in the latest 1.07 version. We ran the game's built-in performance test with all the features, except antialiasing, set to maximum and soft shadows enabled.

Quake 4 is primarily a CPU test. It's especially interesting because its multithreaded, so effects rendering is divided among a CPU's two cores. We used a custom timedemo for our tests.

You can bag on FutureMark's *3DMark*-series of benchmarks for being synthetic, but at one point, the company was the only one to offer a next-generation test and it accurately predicted which graphics architecture was better before there were any real-world tests. We used the Shader Model 3.0 test called Deep Freeze to isolate each machine's graphics prowess.

The new RTS *Company of Heroes* is fun to play, nice to look at, and a total system hog. We ran the game's built-in performance test with the maximum settings at 1600x1200 to see if we could drag these machines down. Unfortunately, we haven't been able to pinpoint exactly what the game tests. Last month in our midrange CPU showdown, we didn't find the benchmark to be particularly CPU-bound, so we assumed it would lean on the GPU. But as you'll see below, the results we received are a little odd and somewhat confusing. We're reporting our *CoH* results for all the WW2 strategy buffs, but further analysis is needed.

BENCHMARKS

	POLYWELL	VELOCITY	ALIENWARE	CYBERPOWER	SYSTEMAX	GATEWAY	OVERDRIVE	ZERO POINT*
FEAR 1.07 (FPS)	79.0	78.0	43.0	74.0	74.0	70.0	**83.0**	80.0
QUAKE 4 1.2 (FPS)	121.7	120.1	78.7	**137.8**	136.4	114.4	133.7	110.5
3DMARK06 DEEP FREEZE (FPS)	35.4	35.3	23.5	**42.9**	WNR	**42.8**	37.7	39.7
COMPANY OF HEROES (FPS)	34.5	39.0	42.7	42.7	**46.5**	21.3	42.1	77.1
ADOBE PHOTOSHOP CS2 (SEC)	**186**	218	227	216	190	195	202	295
ADOBE PREMIERE PRO 2.0 (SEC)	2,030	2,185	2,025	1,943	2,030	2,034	**1,564**	3,000
AHEAD NERO 7.5 RECODE 2.0 (SEC)	2,058	2,185	2,089	1,993	2,140	2,187	**1,669**	2,648

**Our current desktop zero-point rig is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.*

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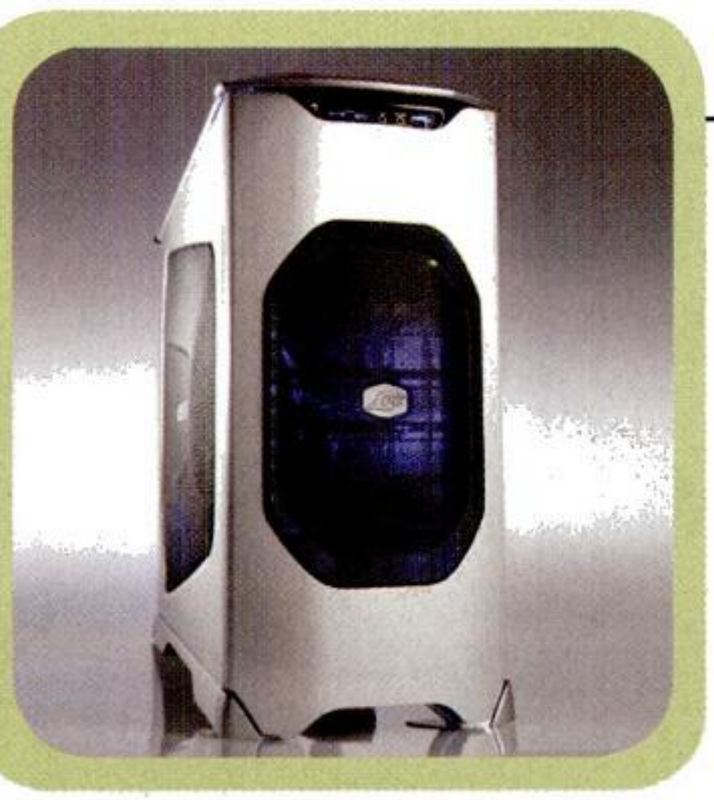
UNDER THE HOOD

	POLYWELL	VELOCITY	ALIENWARE	CYBERPOWER	SYSTEMAX	GATEWAY	OVERDRIVE
CPU	Intel Core 2 Duo E6700 (2.66GHz)	Intel Core 2 Duo E6700 (OC'd to 2.95GHz)	Intel Core 2 Duo E6700 (2.66GHz)	Intel Core 2 Duo E6800 (2.93GHZ)	Intel Core 2 Duo E6700 (2.66GHz)	Intel Core 2 Duo E6700 (2.66GHz)	Intel 2.4GHz Core 2 Duo E6600 (OC'd to 3.46GHz)
MOBO	Asus P5N32-SLI SE Deluxe (nForce4 SLI Intel Edition chipset)	nForce 570 Engineering Sample	Intel D975XBX	Intel D975XBX	Intel D975XBX	Intel D975XBG	Gigabyte GA-965P-DS3 (Intel 965P chipset)
RAM	2GB DDR2/800	2GB DDR2/800	2GB DDR2/800	2GB DDR2/800	2GB Corsair DDR2/800	2GB DDR2/667	2GB DDR2/800 OC'd to 963MHz
STORAGE	Two Western Digital 150GB Raptors in RAID 0	Western Digital 320GB SATA	Samsung 250GB SATA	Western Digital 250GB Caviar SATA	Two Western Digital 74GB Raptors in RAID 0; one Seagate 320GB SATA Barracuda	Two Western Digital 150GB Raptors in RAID 0	Seagate 250GB SATA Barracuda
OPTICAL	Sony DW-Q120A	Lite-On DVD-RW SHM-165H65; Lite-On DVD-ROM SOHC-5236V	NEC DVD-RW ND-3550A	NEC DVD/RW ND-3550A	Lite-On DVD-RW SHW-160P65; Lite-On Combo SOHC-5236V	Hitachi HL-DT-ST GSA-H11N; HL-DT-ST GWA-4165B	Sony DW-Q120A
VIDEOCARD	Two Nvidia GeForce 7950 GT in SLI (550MHz/700MHz)	Two GeForce 7950 GT in SLI (550MHz/700Mhz)	ATI Radeon X1950 XTX (650MHz/1GHz)	Two ATI X1950 XTX in CrossFire (650MHz/1GHz)	Two ATI Radeon X1950 XTX in CrossFire (650MHz/1GHz)	Two ATI Radeon X1950 XTX in CrossFire (650MHz/1GHz)	Nvidia GeForce 7950 GX2 (600MHz/776MHz)
SOUNDCARD	Onboard RealTek	Onboard RealTek	Creative X-Fi Extreme Music	Onboard Sigmatel	Creative Labs Sound Blaster X-Fi	Onboard Sigmatel	Onboard RealTek
CASE	Unknown	Lian Li custom	Custom Alienware	CoolerMaster Mystique	Systemax	Gateway	Cooler Master CMStacker 830
BOOT	51 sec	42 sec	45 sec	49 sec	53 sec	49 sec	33 sec
DOWN	8 sec	9 sec	23 sec	11 sec	12 sec	12 sec	20 sec
VERDICT	7	5	6	8	5	6	9



Overdrive's overclocked monster takes the win, thanks to flaky performance by its competitors.

A Messy Win Is Still a Win

When you're used to the specs, fit, and finish of systems that cost more than some cars, a roomful of midrange PCs can be a shock to the system. It's not that we were expecting $900 paint jobs, but we were expecting fewer problems. Of the seven boxes we received, no fewer than *four* had issues that we deemed major enough to mention. From recurring registry errors to unstable overclocking to sub-par performance and non-functional USB ports, the review roundup certainly didn't go as smoothly as we thought it would.

The competition also caught some of our vendors flat-footed. Old-hand Alienware, who we expected to at least place in the top three, if not win, ended up being dead last with its single-GPU config. Perhaps the company found the $2,500 limit uninspiring. Velocity Micro—another favorite—also bobbled the ball by reaching too far with its overclocking attempt. Even the winner—Overdrive's "I Can't Believe It Runs On Air" 3.46GHz overclocked Core 2 Duo box—wasn't our initial favorite. We actually preferred the far more complete loadouts of the CyberPower, Systemax, and Gateway rigs. In the end, however, we'll always choose performance and stability over specs. On these counts Overdrive delivers. Because, let's face it: Whether a rig is $2,500 or $10,000, you don't want problems right out of the box!

Overdrive's Core2.GX2 backs into the winner's circle, but that shouldn't tarnish the achievement. The company's hardware hackers managed to get a 2.4GHz Core 2 Duo E6600 to a stable 3.46GHz with a stock Intel heatsink. That in itself is worthy of praise. MPC

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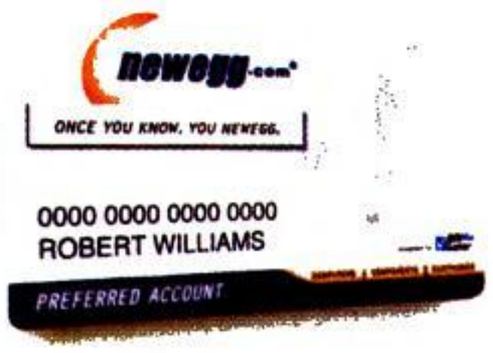

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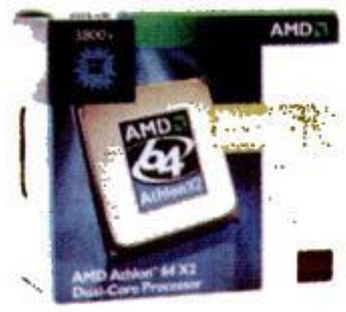

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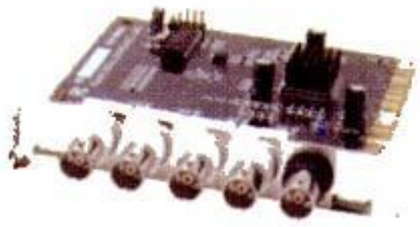

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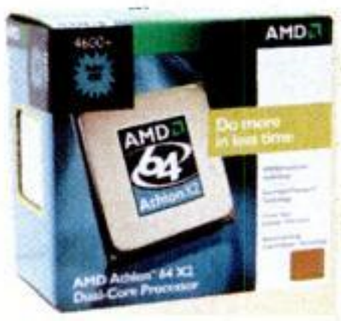

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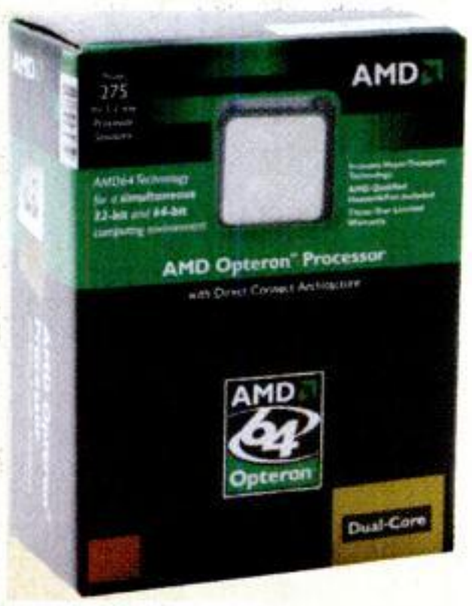

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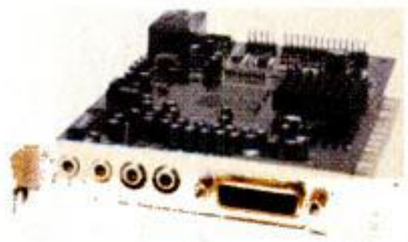

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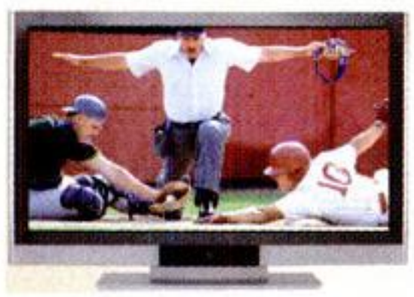

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BEST OF THE BEST 2006

Ladies and gentlemen, welcome to the top of the mountain. The apex of technological achievement. Our first annual Best Of The Best awards! Only superior hardware is even considered for this honor, and just a select few components actually make the grade. So without further ado, let's meet the winners!

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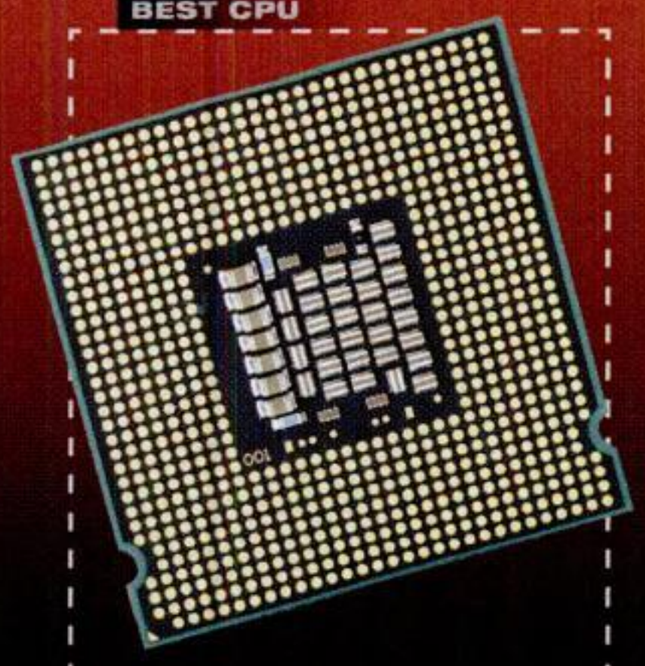
BEST CPU



Intel Core 2 Extreme QX6800

We were split on our choice for top proc: Intel's Core 2 Extreme X6800 features a 2.93GHz clock speed but has just two cores, while the Core 2 Extreme QX6800 sports four cores but runs at just 2.66GHz. Despite the dual-core Core 2 Extreme's better performance with most of today's applications and games, we decided we'd have to have rocks for brains to pass on four execution cores for a two-core design. That's because today's games and apps, which are mostly single-threaded or support just two threads, will eventually be multithreaded. So buy the quad-core CPU today—it will actually get faster as future applications utilize more cores.

(See story on page 48)

$1,000, www.intel.com

BEST MOTHERBOARD

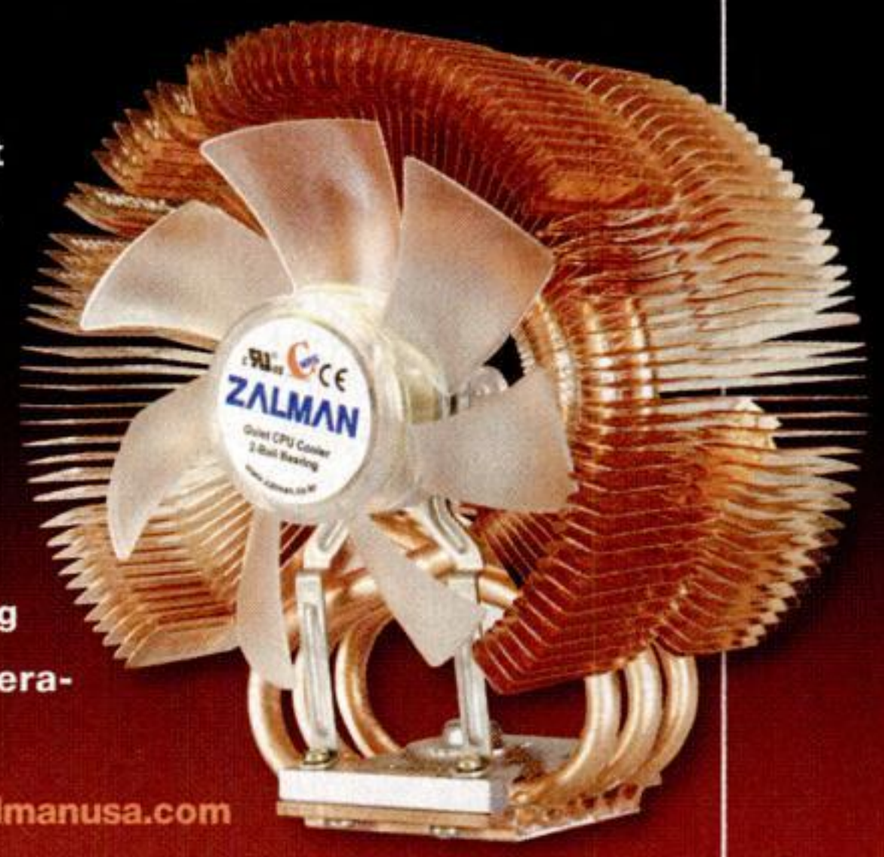
Asus P5W DH Deluxe

What, were you expecting an nForce 590 SLI Intel Edition motherboard? We were too, but Nvidia's lustworthy 590 chipset remains a no-show. No problem. Asus' P5W DH Deluxe board is here to save the day. The board features beefy heatsinks, wireless capability, and a driverless RAID setup. Even without SLI support, you can still slot a GeForce 7950 GX2, a Sound Blaster X-Fi, and any other PCI card of your choosing. Combine that with Intel's new Core 2 Extreme QX6800 quad-core processor and stand back, mama! A dual-GPU machine with quad-core processing makes us happy campers, indeed.

(Reviewed October 2006) $250, www.asus.com

BEST AIR-COOLING

Zalman CNPS9500 LED



Cool and quiet—two traits that are absolutely crucial in an aftermarket CPU cooler. That's why we love the CNPS9500 LED; it's one of the quietest coolers we've tested, yet it delivers kick-ass cooling performance. By spreading the cooling fins in a tunnel around the fan, the CNPS9500 LED achieves astounding temperatures and whisper-quiet operation, just the way we like it.

(Reviewed October 2005) $50, www.zalmanusa.com

BEST WATER-COOLING

Danger Den Custom

Whether you're looking to water-cool your rig to minimize noise or maximize your overclocking potential, Danger Den has the parts for you. The beautiful thing about Danger Den is that you aren't constrained to the parts included in one particular kit. Although the company does sell several good universal kits, you can also mix and match the exact water block, pump, radiator, and tubing you're looking for to get the perfect config for your rig.

(Reviewed July 2006)

Price varies, www.dangerdenstore.com

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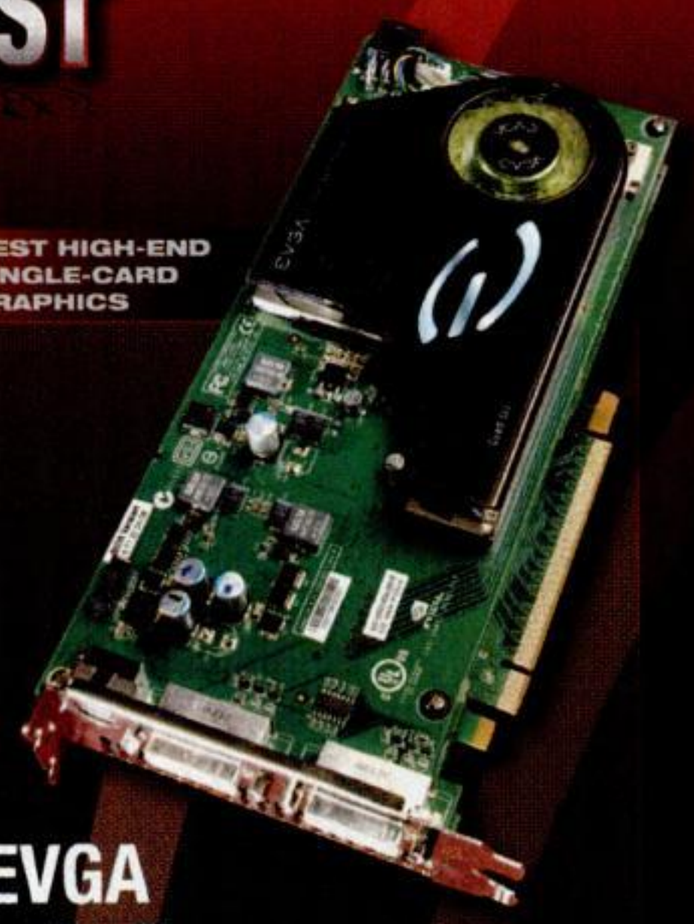
BEST HIGH-END SINGLE-CARD GRAPHICS



EVGA e-GeForce 7950 GX2

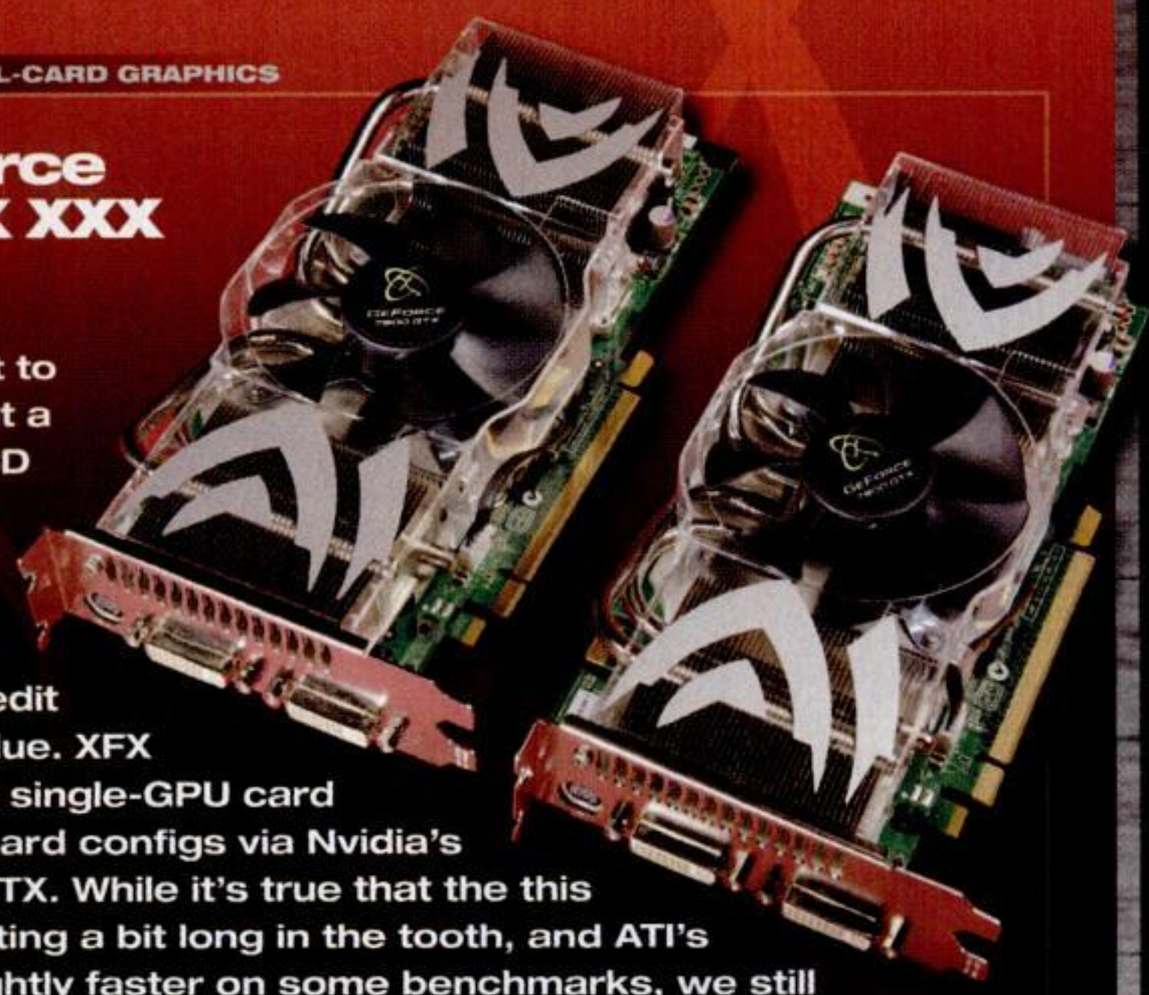
ATI's X1950 XTX might be the fastest single GPU on the scene, but there's no way it can compete with a videocard equipped with a pair of Nvidia's 7950 GX2 processors and a dual 512MB frame buffer.

And even though our opinion of quad SLI is on par with our feelings about CrossFire (both suck), the fact remains that you don't need a special motherboard or core-logic chipset to benefit from Nvidia's dual-GPU technology. Plus, all 7950 GX2 cards are HDCP compliant, for everyone itchin' to upgrade to a Blu-ray or HD-DVD drive—surely *someone* is.

(Reviewed August 2006) $495, www.evga.com

BEST HIGH-END DUAL-CARD GRAPHICS

XFX GeForce 7900 GTX XXX Edition



We find it difficult to get excited about a top-shelf Direct3D 9.0 videocard this close to the release of Direct3D 10, but we must give credit where credit is due. XFX delivers the best single-GPU card for use in multi-card configs via Nvidia's GeForce 7900 GTX. While it's true that the this processor is getting a bit long in the tooth, and ATI's X1950 XTX is slightly faster on some benchmarks, we still believe Nvidia's SLI is a far superior solution to ATI's CrossFire. And with its XXX Edition, XFX pushes the 7900 GTX to the limit, bumping the core clock speed to a blistering 700MHz and its 512MB of GDDR3 memory all the way to 900MHz.

(Reviewed August 2006) $392, www.xfxforce.com

BEST MIDRANGE VIDEOCARD

ATI Radeon X1950 Pro

We're pretty stoked about ATI's newest midrange card. The X1950 Pro not only delivers 36 pixel-shader units, eight vertex shaders, and a quiet cooler for less than 200 smackers, it also resolves many of our complaints about ATI's CrossFire dual-videocard solution (no more external cable; no more master/slave setup). It's also the cheapest card we've seen that supports analog video in, as well as out.

(Reviewed in this issue) $200, www.ati.com

BEST LCD MONITOR

Dell 2407WFP

We're all about "performance at any cost," but when we can score superior product at a bargain price, we're ecstatic. Which is why Dell's 24-inch widescreen has us doing cartwheels (metaphorically speaking). The 2407WFP offers solid performance and damn-near every amenity: an ergo stand, interface options aplenty (including four USB 2.0 ports), and a built-in media reader. All at a price that significantly undercuts the competition.

(Reviewed September 2006) $800, www.dell.com

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BEST OF THE BEST

BEST HEADPHONES AND EARBUDS

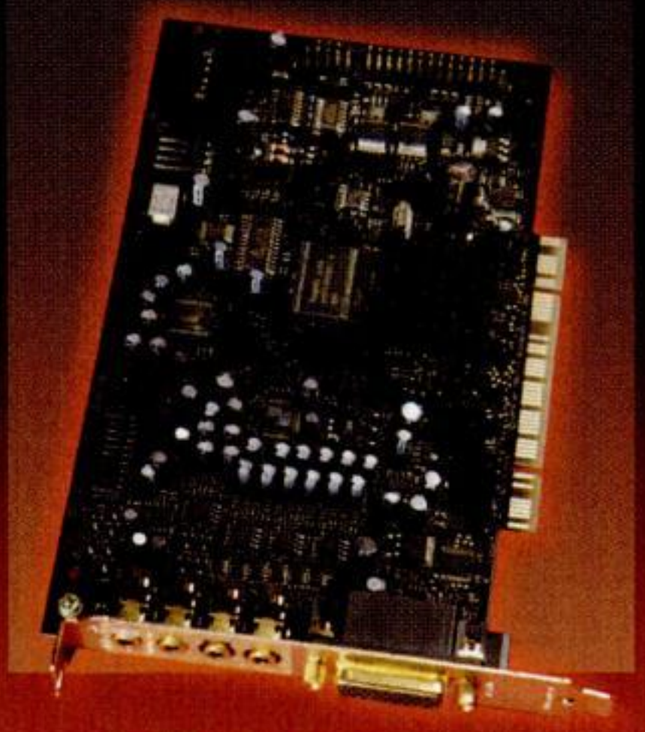
Ultrasone Proline 750; Shure E4g

Your ears are precious; don't make them suffer crappy headphones or earbuds. We've listened to a lot of cans, but haven't found any that are more accurate than Ultrasone's Proline 750. Their unique transducer array reflects audio waves off the folds of your ears to deliver the most natural sound we've heard. When it comes to wringing the best possible audio performance out of your media player, Shure's E4g earbuds are worth every penny. They're supremely comfortable, and they block audible distractions far better than any noise-canceling headphones we've tested.
(Proline 750 reviewed May 2005; E4g reviewed February 2006) $400, www.ultrasoneusa.com; $300, www.shure.com

BEST SOUNDCARD

Creative Labs X-Fi XtremeMusic

If our PC were a life raft and we were forced to toss two cards off for our survival, we'd cling to our Creative Labs X-Fi like nobody's business. Aegia PhysX card? Into the drink you go. Killer NIC? Here's the key to Davy Jones' locker. Sure, hardware audio acceleration might be unnecessary with quad-core computing, but we still think a PC's sound system should *sound* good.
(Reviewed September 2005)
$120, www.soundblaster.com



BEST DIGITAL MEDIA PLAYER

Archos 604

Apple's video iPods are fine digital media players, and Microsoft's Zune seems interesting, but the features and performance of the Archos 604 instills pure lust in our techie hearts. The 604's luscious, 4.3-inch, 16:9 aspect-ratio screen steals the show, but this player sounds every bit as good as it looks.
(Reviewed Holiday 2006)
$350, www.archos.com

BEST SPEAKERS

M-Audio LX4 2.1 and 5.1 Expander System

There's no shortage of high-powered speakers on the market, but we've long insisted that speakers deliver an accurate—not just loud—performance. And while M-Audio's LX4 2.1, coupled with its 5.1 Expander System, are classified as studio monitors, these speakers sound as delicious with games as they do in a mix-down environment.
(Reviewed December 2005)
$350 + $200, www.m-audio.com

BEST STREAMING BOX

Sonos ZP-80

We've seen a number of great streaming-audio systems this year, but the Sonos ZP-80 bundle remains the most brilliant. Sonos' handheld controller is already near perfection, but the company isn't resting on its laurels: Version 2.0 of its software puts Rhapsody's staggering library at your fingertips without the need to boot your PC.
(Reviewed July 2006)
$1,000, www.sonos.com

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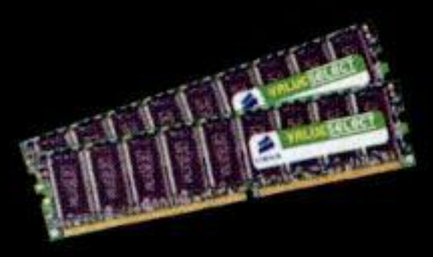

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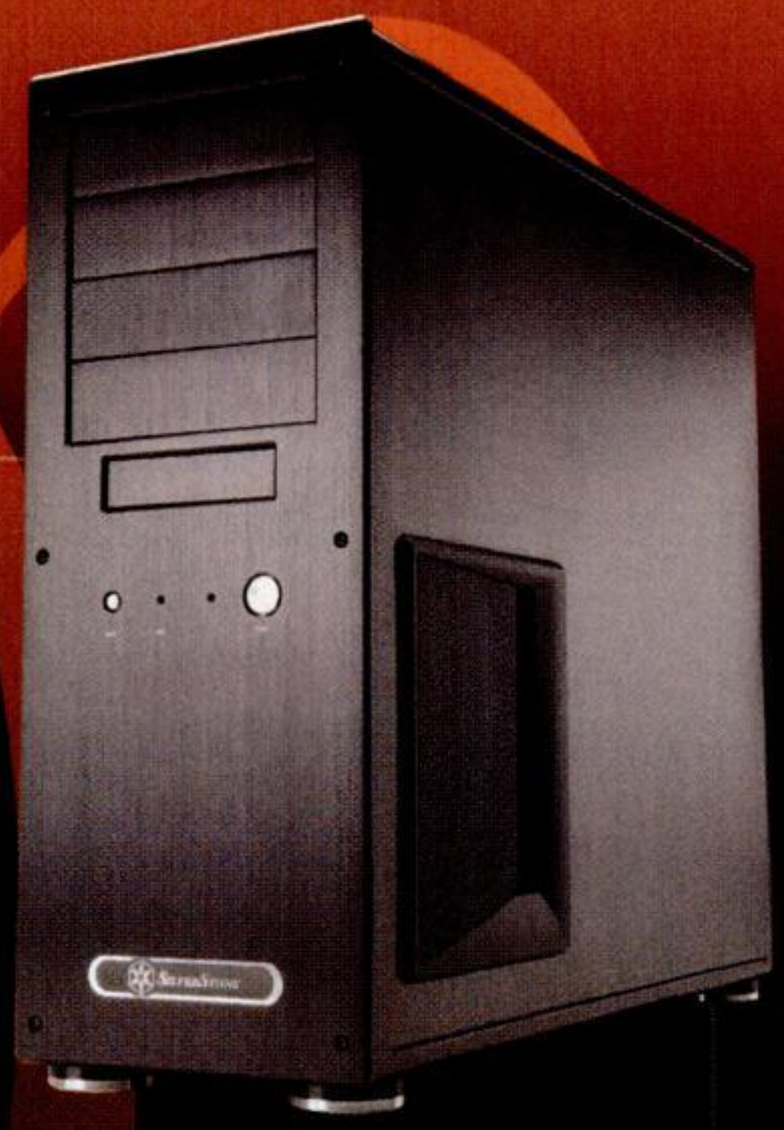
BEST CASE

Silverstone Temjin TJ09



We were set to declare the SilverStone Temjin TJ07—our fave for all of 2005—as the best case currency can procure, but then another box landed on our dock. The Temjin TJ09 reprises the now-classic design with even snazzier aluminum construction, a pop-up USB/FireWire/headphone connector panel, and two quick-release hard drive cages. Sweet.
(Reviewed December 2006) $250, www.silverstonetek.com

BEST USB KEY

SanDisk Cruzer Titanium 2GB

A surefire way to win hearts at *Maximum PC* is to send us a product that's beautiful, functional, and *fast*. The Cruzer Titanium is all three. This is the fastest USB thumb drive we've ever tested, delivering top marks in both reads and writes. The fact that its USB connector slides neatly into its shell is just the icing on an already tasty cake.
(Reviewed November 2006) $110, www.sandisk.com

BEST OPTICAL DISC BURNER

Plextor PX-7558A

With Intel eliminating PATA completely in the 965 chipset, we see the writing on the wall: SATA optical is the future. Plextor's second-gen PX-755SA replaces the company's original SATA drive, the PX-716SA, and also gives you faster double-layer burn rates and such nifty features as the ability to "erase" a write-once disc by burning all the pits on the surface.
$130, www.plextor.com

BEST BACKUP DRIVE

Seagate 750GB Push Button Backup

For the first time ever, the backup drive was a hotly contested category. With two competing Seagate external drives facing off—one a speedy 500GB eSATA drive, the other a 750GB USB-only drive—the choice was difficult. In the end, we sacrificed the significantly speedier eSATA interface for the much roomier 750GB capacity of the USB model, and all was right with the world.
(Reviewed Holiday 2006) $550, www.seagate.com

BEST HARD DRIVE

Western Digital Raptor 150GB

They say that speed kills. We're not really sure who "they" are, or what's being killed, but if the dictum is true, then this 10,000rpm hard drive should definitely come with a warning label.

Sure, it has just 150GB of capacity, but those are a hundred and a half insanely fast gigs. And if you shell out an extra $50 for the Raptor X version, you get a window through which you can see the drive's platters and read head in glorious fast action.
(Reviewed March 2006) $350, www.westerndigital.com

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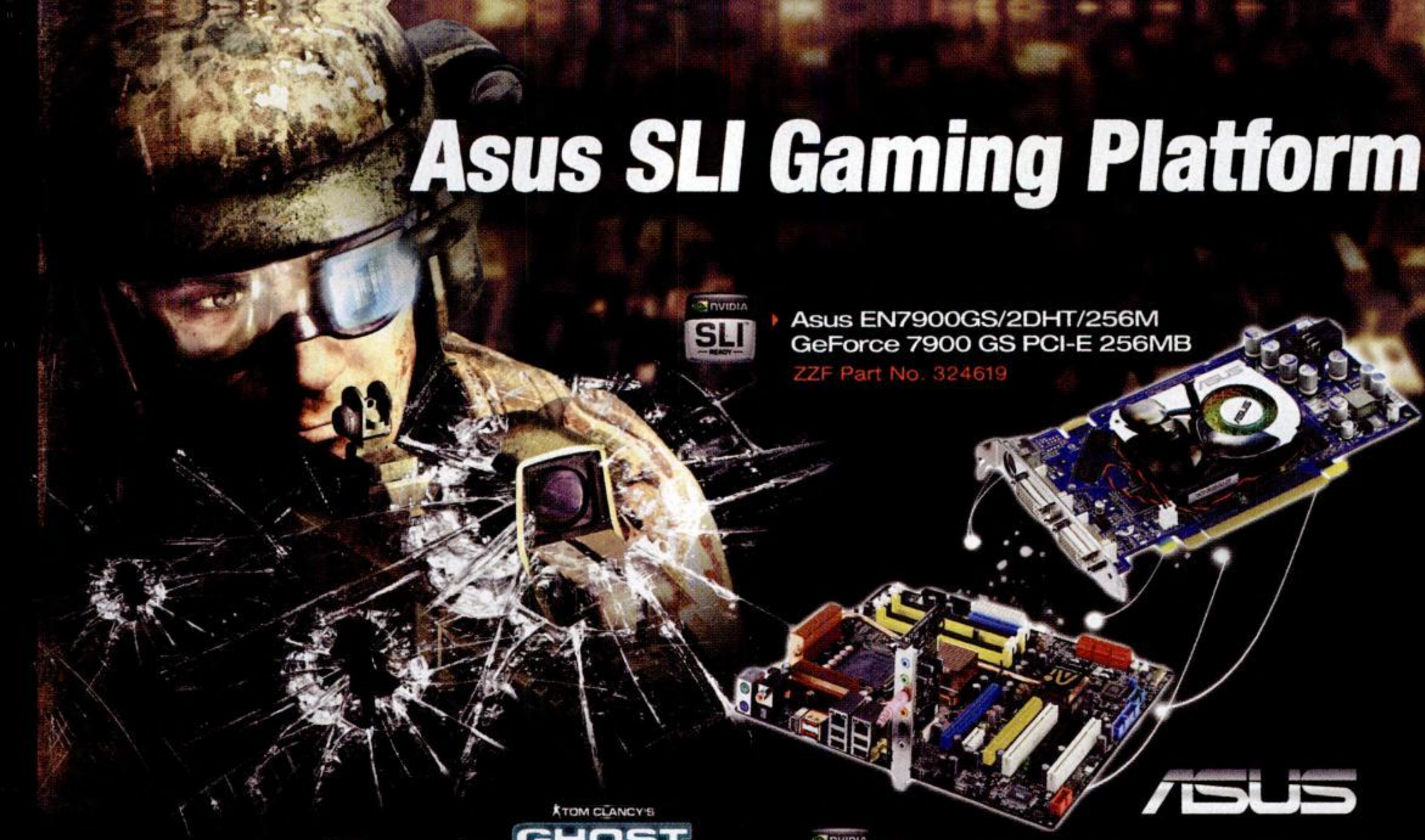
Asus SLI Gaming Platform



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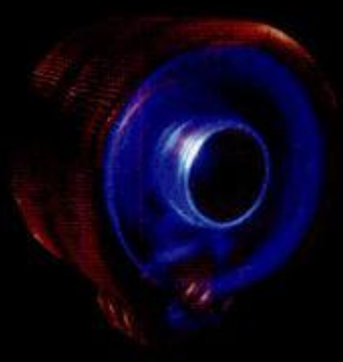

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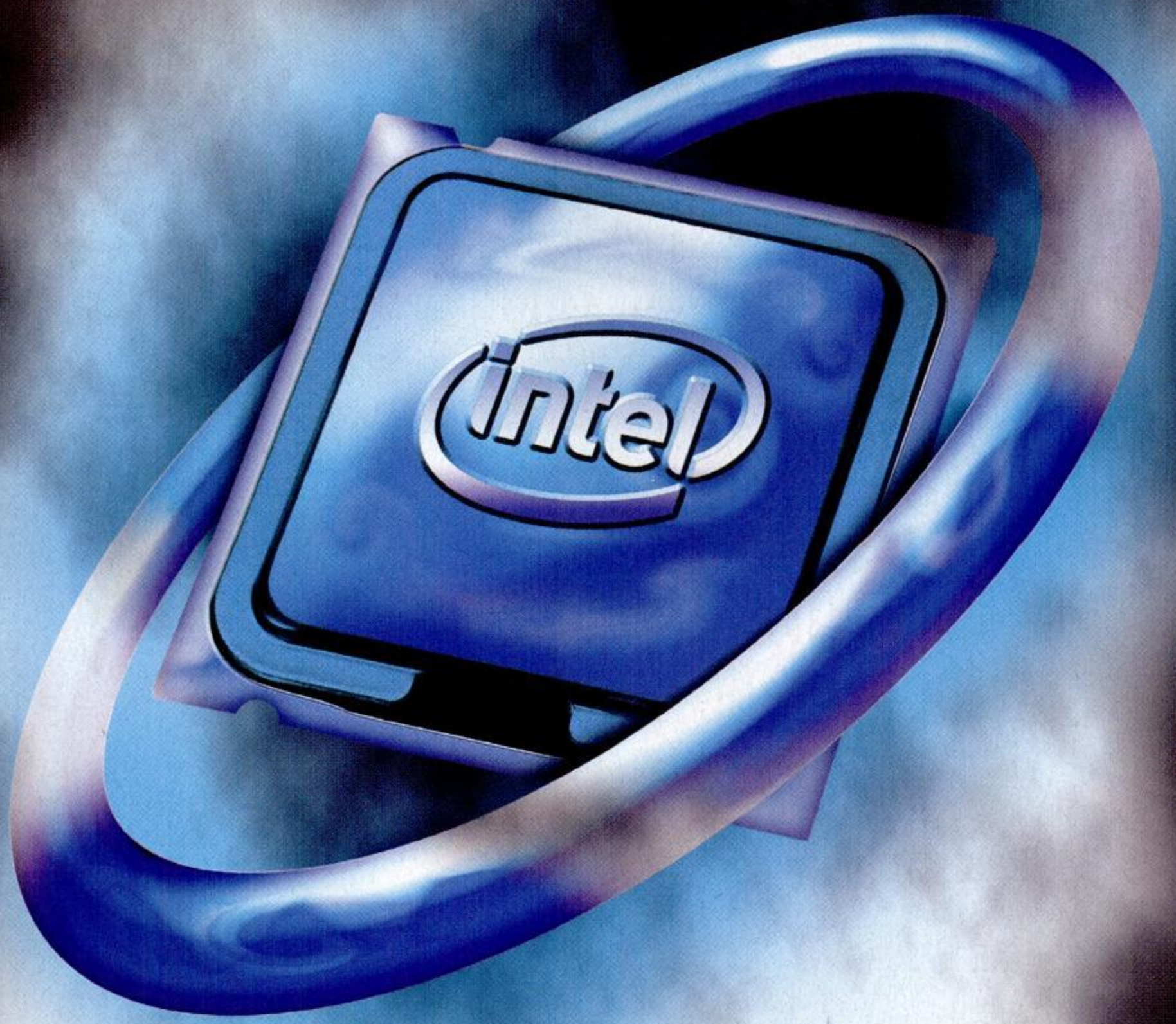
Quad Power!



Intel pours on the power with the world's first quad-core PC processor

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Whoever said that technology just gets cheaper and better should have his or her name on a plaque somewhere in Silicon Valley; because, baby, technology just got cheaper and better.

Intel's Core 2 Extreme QX6800 steps up the pure PC-power arms race by offering four execution cores in a single CPU. Just two years ago, the only place you'd find such a beast would be in a midrange server box or a high-end workstation. But today you'll find four-in-one procs in average-Joe PCs or on the shelves of the local screwdriver shack, at civilian prices.

We take a tricorder to Intel's new processor to answer the burning question: Is quad core right for you?

BY GORDON MAH UNG

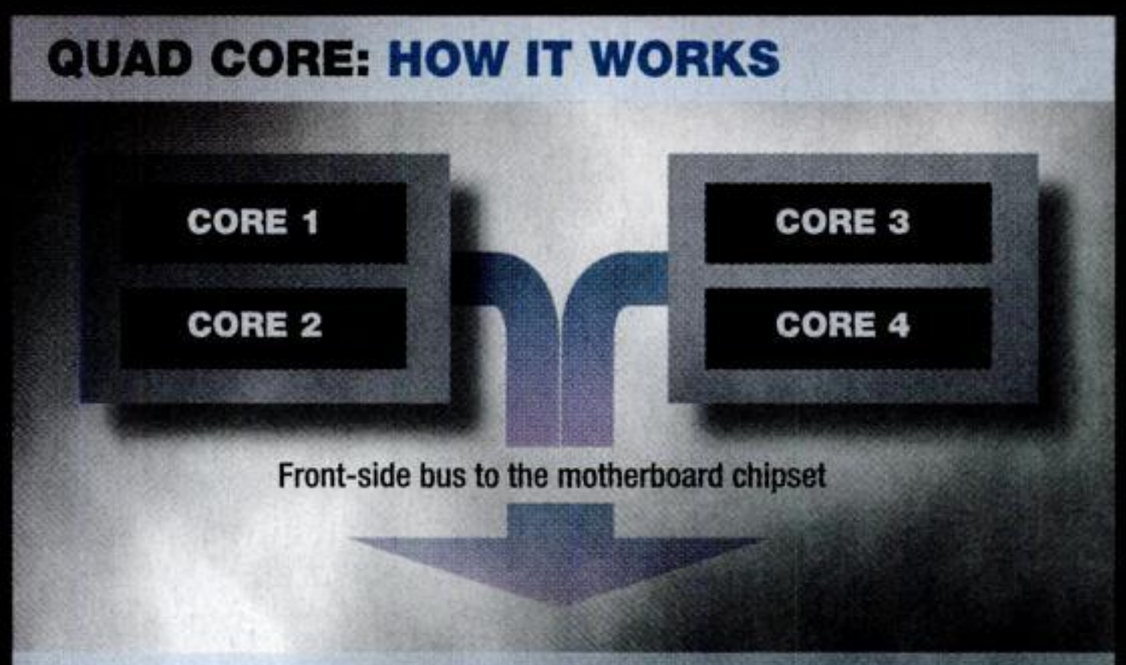
Q Great Zeus! How did Intel make a quad-core CPU so quickly after producing its last CPU?

A Intel did it using a little trick it learned when making the Presler version of the Pentium D processor. Unlike the company's original Smithfield Pentium D that featured a monolithic dual core—two cores on a single contiguous piece of silicon—Intel was able to put two single-core Presler chips inside the same CPU package and connect them after the fact. With the Core 2 QX6800, Intel takes two dual-core Core 2 pieces of silicon and connects them inside the CPU package to create a quad core.

Head spinning? Think of the quad-core QX6800 as two separate islands, each with two cities. A single bridge (the front-side bus) connects both the islands to the rest of the world (the mobo chipset). The cities on each island know about each other, and residents can pass from City 1 to City 2 at relatively good speeds, but if a resident wants to visit City 3 or City 4, he has to drive across the bridge and make a U-turn through the chipset before heading back over the bridge to the other island.

AMD has stuck with a monolithic die approach (where all four cities are joined on the same island and interconnected) and has slammed Intel's approach as a hack. Intel responds that it doesn't matter how you deliver the quad cores, just as long as you do. In other words: Would you rather have quad core today at the *same* price as a dual-core processor or would you rather wait until the end of next year?

It's worth noting that putting both cores on the same piece of silicon is meaningless if it isn't done right. Intel's original Pentium D Smithfield was a monolithic dual core, but those cores too could only communicate via the front-side bus. It was like building two cities next to each other with an impervious wall running down the center.



The two dual-core chips that form the quad QX6800 communicate with each other by circuitous means.

Q What else does Intel get from using this method?

A Besides getting quad core now, the two-dies-tied-together strategy also helps Intel keep costs a little lower. If the chip were a monolithic die, every single core on the die would have to run at 2.66GHz for it to be viable. Because there's always the potential for defects in any die that comes off the production line, such a strategy would lower the overall yield of the chips. By using separate chips, Intel can hunt through its production run for two dual-core chips that run at 2.66GHz, which is much easier and cheaper. It's a little like hunting for a four-leaf clover. If you could engineer the ability to take two two-leaf clovers and join them together, you could farm a hell of a lot more four-leaf clovers than the poor sap combing the fields on

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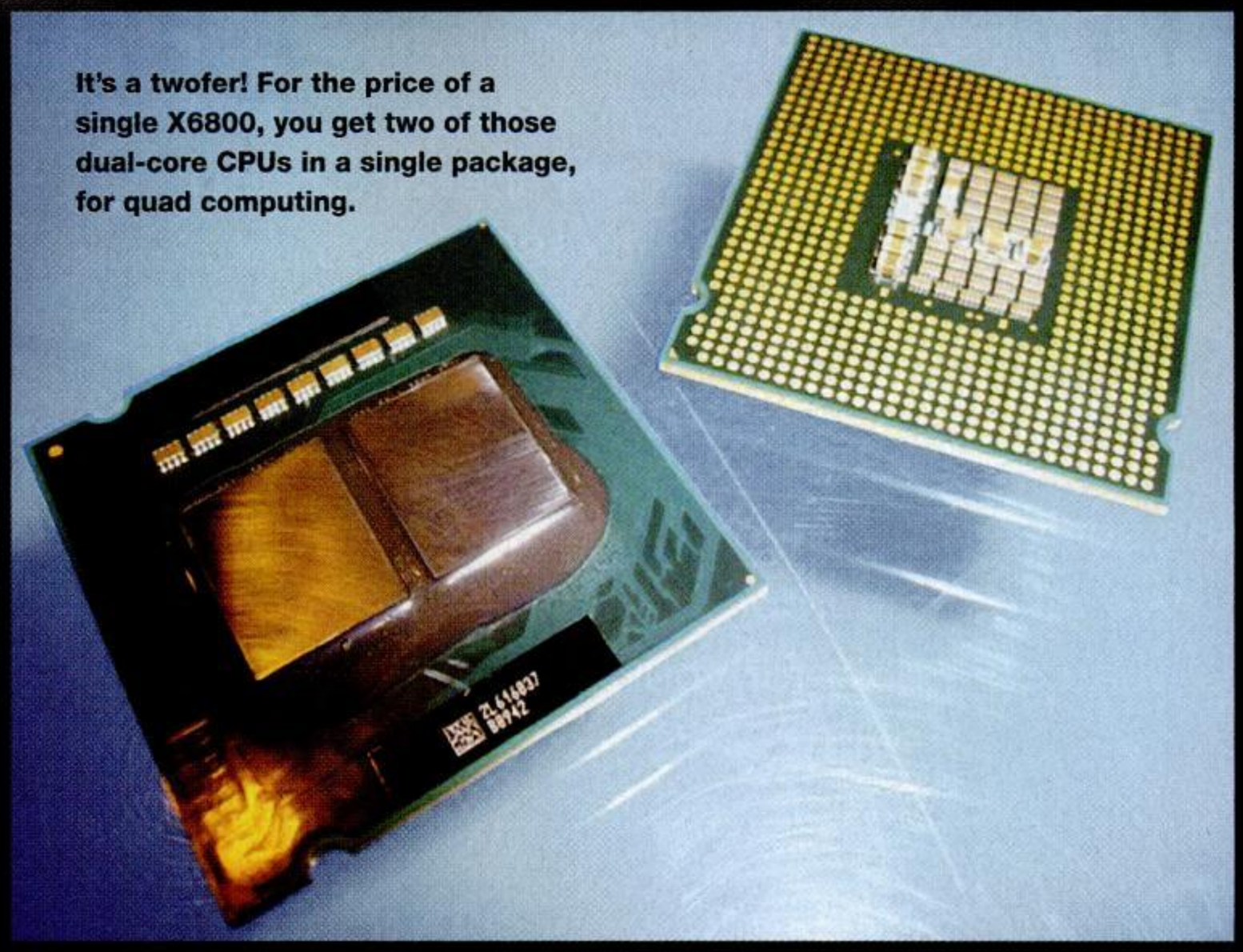
his hands and knees looking for naturally occurring specimens.

Q My Pentium Extreme Edition shows up as four CPUs in the Task Manager. Is that the same as a quad core?

A No. The NetBurst-based PEE840, PEE955, and PEE965 all feature dual-core CPUs with support for Hyper-Threading, which turns each single core into a virtual dual-core CPU. While Hyper-Threading works well enough, it's in no way comparable to a quad-core processor. Intel doesn't offer HT on any of its current Core-based processors—the company says HT cost transistors that were better spent elsewhere right now—but it hasn't ruled out the return of that technology.



It's a twofer! For the price of a single X6800, you get two of those dual-core CPUs in a single package, for quad computing.

Q What about front-side bus performance? Why doesn't the quad core have a 1,333MHz FSB like the Xeon 5100 does today?

A Unlike AMD, which connects all of its cores and CPUs using a direct chip-to-chip architecture, Intel is currently wed to its shared-bus topology. Remember the bridge in our island analogy? That's the front-side bus, and in order to move from one island (die) to the other, you have to travel that bridge all the way to the mainland before making your way back to the other island. And that bridge is congested with all kinds of traffic that can affect travel time.

Intel claims that an analysis of the bus traffic under heavy loads using today's applications indicates that we're not even close to saturating the FSB. Is that true? It's hard to say. Intel engineers do admit that it's possible to saturate the bus, but that you'd have to write code specifically to do that. By foregoing the 1,333MHz bus for this generation, Intel is putting its architecture where its mouth is. Still, no one at Intel has ruled out a move to a faster front-side bus in the future, which suggests that the company thinks traffic might need to be addressed at some point.

Q If the QX6800 is two Core 2 CPUs, does that mean it has 8MB of L2 cache?

A Technically, yes. Because the QX6800 is essentially two Core 2 Duo E6700s welded together, the cache remains the same per die (64KB of L1 cache and 4MB of "smart" L2 cache), for a total of 8MB of L2 cache among the four cores. Remember, however, that each set of two cores is on its own island. The two cores on one island cannot share cache with the two cores on the other.

The cache is still smart, though, which means the two cores on one island can share their 4MB dynamically. If one core is idle, the other core can use all 4MB of the shared L2 cache. Both cores also communicate across the cache—each core knows how much of the cache the other is accessing. In a more traditional design, where each CPU core has its own dedicated cache, if core 1 and core 2 are working on the same data and core 1 needs something that's already in core 2's L2 cache, it can't just grab it, it has to go out to main memory to get it.

So while communication between the two dies has to happen via the comparatively slow front-side bus, communication within the individual dies will enjoy all the benefits of the original Core 2 Duo. This helps supports Intel's claim that the FSB design isn't a problem.

Q Will quad core work in my LGA775 motherboard?

A If you listened to our advice and held off buying an LGA775 mobo until it was certified to run with Core 2 processors, you have a very good chance of it working with a simple BIOS upgrade. That makes us happy because, for the first time in a long time, Intel's CPU and chipset/mobo folks seem to be talking to one another.

Q How can I ensure that the motherboard I buy supports quad-core CPUs?

A The safest way is to check with the vendor. If the website or package says the mobo is quad-core ready, the vendor is on the hook to support it. Still, some motherboards that are capable of supporting quad core require a BIOS update before they will boot a quad. If you don't have access to another LGA775 processor to use when flashing the BIOS, most vendors will either flash the board for you before they ship it out or exchange the board for one with an updated BIOS.

Q Why is Intel offering its quad core and dual core at the same price? Wouldn't it make sense to charge more for quad?

A The procs are priced as such because in today's computing climate, each offers advantages, but neither can claim outright superiority. The dual-core Core 2

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Extreme X6800 runs at 2.93GHz, while the quad-core Core 2 Extreme QX6800 runs slower, at 2.66GHz. Today, most desktop applications are single-threaded—and the handful of today's multithreaded apps are optimized to accommodate two cores—so that 300MHz gap gives dual core a performance advantage. Of course, when running true multithreaded apps (which will become increasingly more common) or running multiple single-threaded apps, quad has the advantage.

Intel Core 2: Dual vs. Quad

	CORE 2 EXTREME X6800	CORE 2 EXTREME QX6800
CLOCK SPEED	2.93GHz	2.66GHz
CACHE	64KB L1 / 4MB L2	128KB L1 / 8MB L2
EXECUTION CORES	2	4
TRANSISTOR COUNT	291 million	582 million
DIE SIZE	143mm2	286mm2
PROCESS	65nm	65nm
TDP	75	130

Q So you're saying that quad won't make multithreaded applications such as *Quake 4* or *Premiere Pro 2.0* run faster?

A That's the tricky part. With the move to quad core, we're back in the same position we were last year, when people had to choose between the higher-clocked single-core CPUs and the slower dual cores. A majority of today's multithreaded applications are optimized for dual cores and simply don't run enough threads to keep all four cores chugging on the QX6800. *Quake 4*, for example, uses two threads and runs much faster on a dual core than a single core, but it runs slower on the lower-clocked quad.

Q Does that mean I should get a dual core instead of a quad core?

A That depends on your specific needs. If you need the fastest CPU for most of today's apps, the Core 2 Extreme X6800 is still the ticket. But remember, application and game developers are continually updating their code. Today's games might be single-threaded, or at best optimized for dual cores, but tomorrow's games will likely support more than two threads. Ritual, the developer of the upcoming game *Alan Wake*, says it will take full advantage of a quad-core processor in its game engine.

If you want our opinion, you should look to the future, and not the past. And let's not forget the old multitasking argument. Remember how you could suddenly encode a video and play games when you went from a one core to two? Well, by going to four cores you can encode a video using a multithreaded encoder, run a batch process on your digital images, and play a game without bottlenecking the CPU.

Q Will Windows and my applications work with the quad core?

A Microsoft doesn't ship a four-CPU version of Windows XP—quad CPU support has been limited to the server versions of its OSes. But that shouldn't matter, because the company follows the industry-standard "per socket" definition of a CPU. The OS only cares about how many socketed processors you have, not how many cores each processor has. Windows XP Home is limited to a single socket, while XP Pro supports two sockets, so either edition of XP will work fine with quad core. Windows Vista will also work just fine with quad core.

Some application vendors, however, charge extra for multicore versions of software, although most are adopting the per-socket policy.

Q Intel touted energy and thermal savings with Conroe; is the QX6800 a cool chip too, and does it overclock like the Core 2 Duo?

A Intel rates the QX6800 as a 130-watt processor—the same as the nuclear Smithfield and Presler CPUs. Even scarier, Intel shipped our review unit with a fan that spun at about 6,000rpm to prevent any unintentional thermal throttling impacting performance. We've received inconsistent answers from Intel officials when asked about the thermals on the chip, but one person did say the quad should run significantly cooler than a Presler or Smithfield Pentium D chip. Intel says you should plan your cooling for the 130-watt rating, which should include headroom for enthusiasts who like to overclock.

The chip does overclock fairly well. In casual testing, we ran our proc at 2.93GHz, a minor 10 percent clock boost, and didn't experience a single hiccup in any of our benchmarks. OEMs we've talked to say the samples they've tested will run at, or slightly higher than, 3GHz—and that's being conservative. To give you an idea of how confident some vendors are of the quad, a few have already told us they plan to sell the proc overclocked. Intel actually demonstrated a quad running at 3.73GHz at its developer forum, so quad is looking promising for overclocking, if you can keep it cool. And, as always, none of the Extreme CPUs are multiplier-locked.

Q What's next from Intel?

A Intel's next move is to shrink its fabs from 65nm to 45nm. The move to 45nm will be timed with the CPU code-named Penryn. Not much is known about Penryn, but it will be more than just a die shrink of Conroe. After two years of AMD's dominance, we expect Intel to make further microarchitecture enhancements to stay on top. The chatter around the campfire is that Penryn will be a dual-core processor. The sequel to that, code-named Yorkfield, will be a monolithic quad core—four cores on a single piece of silicon. Thus, we'd expect all the cores to communicate directly with each other within the chip, rather than talking across the front-side bus. Budget buyers will also get their quad cake next year when Intel introduces its Core 2 quad CPUs at lower clock speeds and possibly smaller L2 cache sizes than the QX6800.

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Putting Quad to the Test

Our benchmarks reveal some interesting things about multicore computing

To test the new Core 2 Extreme QX6800, we selected a raft of real-world CPU-intensive tasks—video editing, image editing, and video encoding—as well as a handful of games and graphics tests at low resolutions to isolate CPU performance from GPU performance as much as possible. We paired the proc with a new Intel D975XBX2 motherboard with a beta BIOS and drivers so we could compare it with the Core 2 Extreme X6800 in an older Intel D975XBX motherboard. Both systems were equipped with a GeForce 7900 GTX card, a 400GB Western Digital SATA hard drive, and a PC Power and Cooling 1KW power supply, as well as the same graphics drivers running under Windows XP Professional with SP2 installed. We excluded AMD's Athlon 64 FX-62 from this face-off because, well, why bother? It's just not in the same league.

As we alluded to earlier, the benchmarks we had moved to for their multithreaded performance aren't multithreaded enough for quad. From *Premiere Pro 2.0* to *Nero Recode 2* to *Bibble* to *Noise Ninja,* we didn't see the quantum leap forward with QX6800. Sure, when the two procs were tasked with converting 2.7GB of digital RAW files to JPEG using *Bibble* and then removing noise from the images with *Noise Ninja,* the QX6800 was about 19 percent faster. Pretty good but not quite the boost we expected from two extra cores inside.

Despite the QX6800's 10 percent slower clock speed, it was as fast as or a bit faster than the X6800 in a majority of the application benchmarks. It gets even better for the QX6800 with apps that are more multithreaded. Intel has been pimping Sony's new *Vegas 7.0* for reviewers, and we see why. During encoding, the app works dual and quad cores to their full potential. We also saw significant performance benefits when we ran the multithreaded *Quake 4* while encoding an H.264 video in the background.

In straight gaming, however, quad core isn't as strong. As we mentioned previously, the higher-clocked dual-core X6800 is faster in today's games, which are mostly single-threaded. And even *Quake 4,* which is multithreaded, favors the X6800 because apparently the game is optimized for two cores, no more.

As a final test, we overclocked our QX6800 to the same speeds as the X6800 and saw the quad core close the gap in the benchmarks it lost due to the clock deficit.

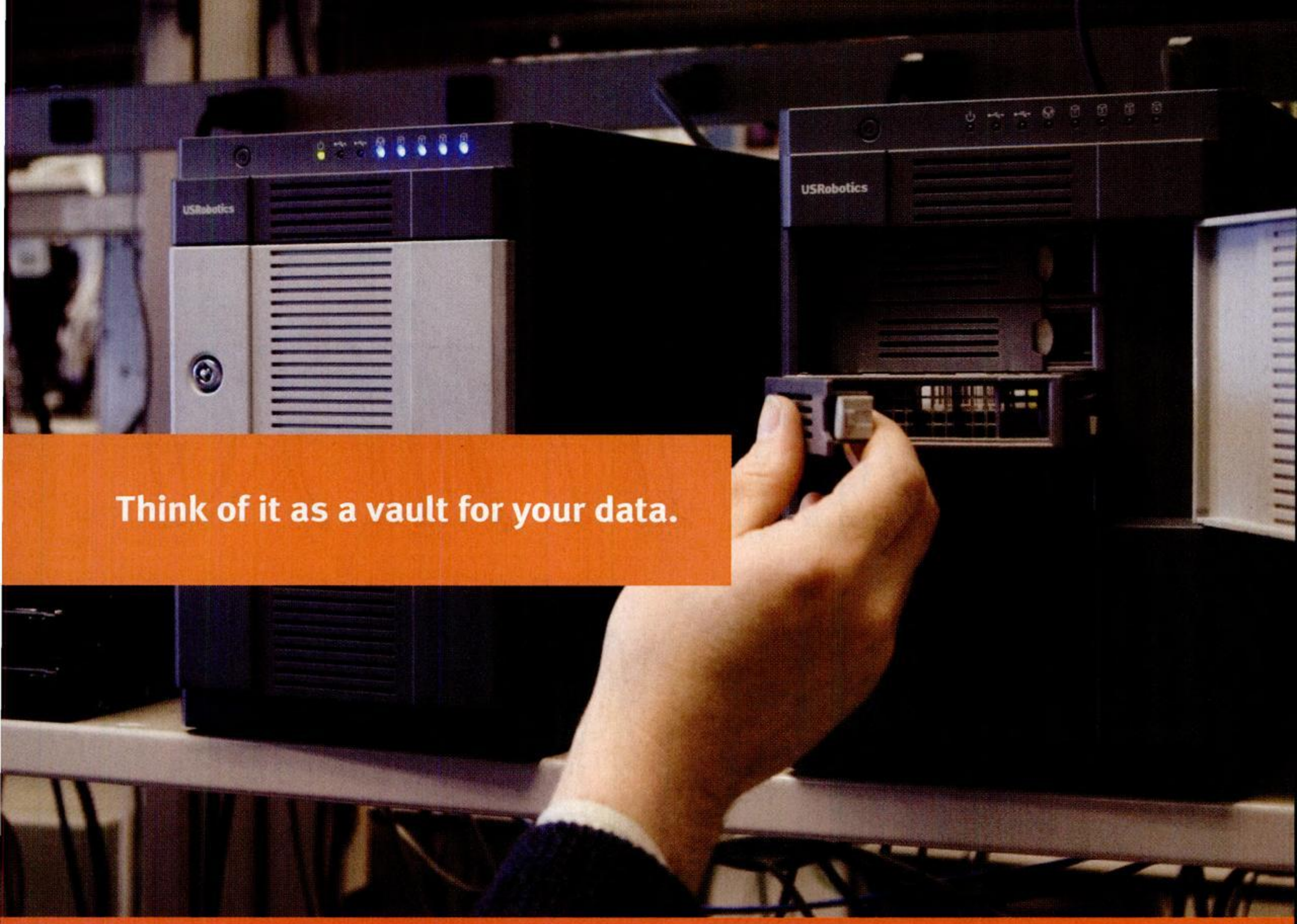
THE UPSHOT

The quad core isn't the decisive winner in the benchmarks because of the 300MHz clock disadvantage. People who can only see into next week will probably go for the dual core, but we think that would be a mistake. If you're willing to perform a minor overclock of 10 percent, you will all but erase the dual core's advantage. Even if you don't, the quad core will end up being faster once developers optimize for it, while the dual-core's performance potential won't change. We liken it to the choice people made between single core and dual core. We suspect that many folks who bought single-core CPUs are wishing they now had dual-core procs. You'll think the same about quad core in 12 to 18 months. With QX6800 costing the same as X6800, it isn't a very hard choice to make. MPC

Benchmarks

	C2E QX6800	C2E X6800	PERFORMANCE DELTA BETWEEN QX6800 AND X6800	C2E QX6800 OVERCLOCKED
CLOCK	2.66GHz	2.93GHz		2.93GHz
APPLICATIONS				
VEGAS 7.0 (SEC)	**252**	378	50%	238
PREMIERE PRO WMV9 (SEC)	1,848	1,835	-0.7%	1,680
PREMIERE PRO WMV9 ADVANCED PROFILE (SEC)	**1,088**	1,291	18.7%	1,040
RECODE 2 IPOD H.264 (SEC)	**1,835**	2,033	10.8%	1,832
RECODE 2 MPEG2 (SEC)	**465**	589	26.7%	440
BIBBLE 4.9 RAW CONVERSION WITH NOISE NINJA (SEC)	**1,450**	1,725	19.0%	2,431???
PHOTOSHOP CS2 (SEC)	219	**211**	-3.7%	206
NOISE NINJA 2.11 (SEC)	**1,457**	1,604	10.1%	1,403
SYNTHETIC TEST				
SCIENCEMARK 2.0	1,478.9	**1,611.6**	-8.2%	1,597.4
PCMARK05	7,590	**7,861**	-3.5%	7,638
PCMARK05 CPU	8,452	7,470	13.6%	8,455
3DMARK06 CPU	**3,897**	2,522	54.5%	2,585
3DMARK06	**6,727**	6,370	5.6%	6,828
GAMING				
3DMARK05 CPU	11,320	11,407	-0.8%	11,148
3DMARK05	10,711	**11,277**	-5%	11,007
QUAKE 4 (FPS)	173.3	**195.0**	-11.1%	198
FEAR 1.07 (FPS)	258	**268**	-3.7%	260
MULTITASKING				
QUAKE 4 WHILE RUNNING AN AVC RENDER IN THE BACKGROUND (FPS)	97	**145**	-33.1%	162

Bold denotes winner.



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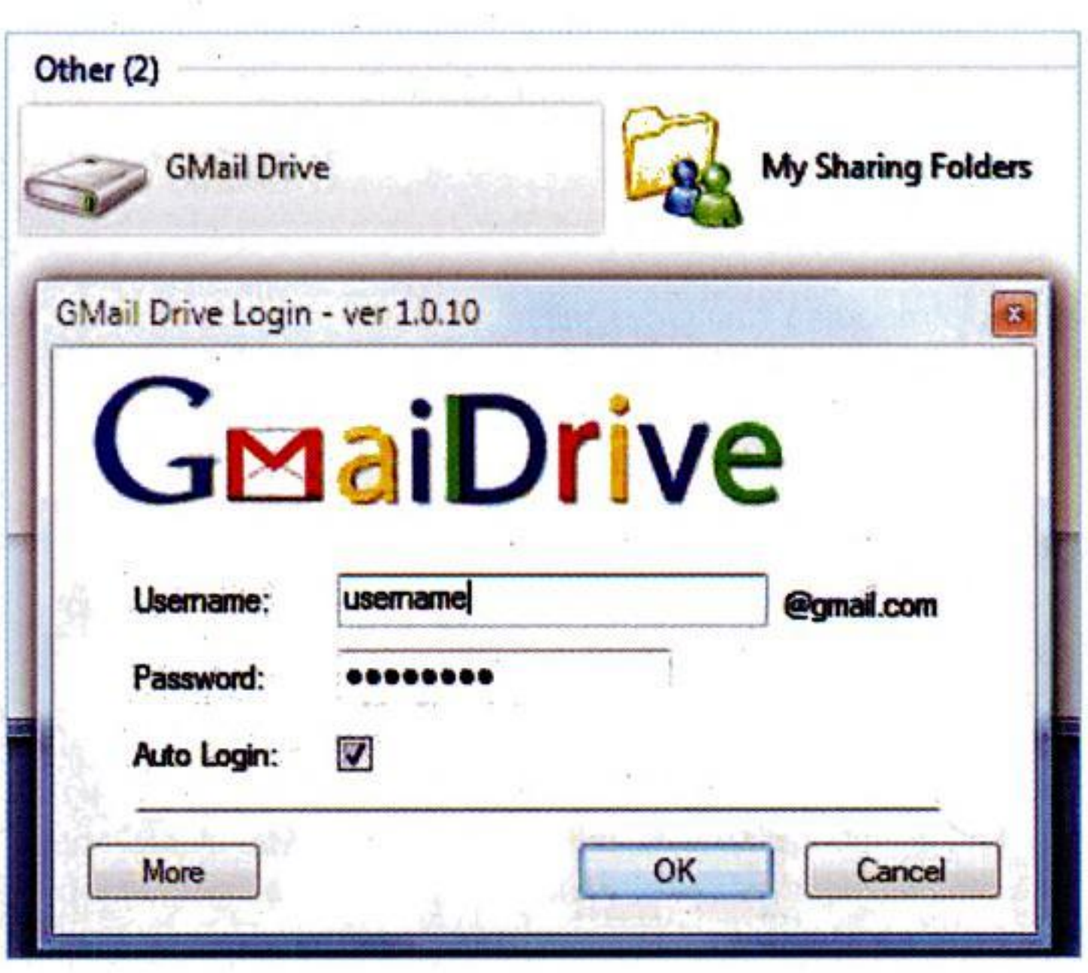
- **FREE GMAIL ACCOUNT**
- **INTERNET CONNECTION**



***Gmail Drive Shell Extension* lets you treat your *Gmail* storage space like an Internet-connected hard drive.**

1 Use Gmail as an Online Storage Vault

Need to keep important files handy? You don't necessarily have to shell out 100 bucks for a high-capacity thumb drive. Instead, use *Gmail's* free 2.7GB of storage as an off-site backup for the files you need access to. The easiest way is to simply attach your file to an email and shoot it to your *Gmail* account. Then you can retrieve it at any time just by logging in and running a quick search of your inbox. Of course, *Gmail's* 10MB attachment limit means you won't be able to archive massive documents. But it's a great way keep your most essential files handy wherever there's an Internet connection.

To take even greater advantage of *Gmail's* free storage space, you'll need to download a helper app. *Firefox* users can download *Gmail Space* from Mozilla's Firefox Add-ons library (**http://addons.mozilla.org/firefox/**), which turns the web browser into an easy-to-use file explorer. The extension lets you drag and drop files directly into *Gmail's* storage space, without having to worry about the attachment size limit.

Alternatively, you can download *Gmail Drive Shell Extension* (free, **www.viksoe.dk/code/gmail.htm**) for more ubiquitous access throughout your Windows PC. *Gmail Drive Shell Extension* sets up your *Gmail* storage space as a network drive on your PC, which you can access simply by double-clicking the GMail Drive icon in My Computer and then entering your *Gmail* username and password. Once you log in, your *Gmail* storage will act just like any other drive on your PC. It even works with Windows Vista.

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2 Filter Your Mail with Positive Thinking

The lowly plus sign gets little respect in this crazy, mixed-up world. But if you use it the right way with *Gmail*, it could become your new best friend. By adding a plus sign and a filter tag to your own *Gmail* address, you can figure out which of the sites that you've brazenly given your address to are turning around, stabbing you in your tender, fleshy backside, and selling it to every half-witted Pr0p3cia spammer on the net.

This little hack doesn't require a single tweak to your *Gmail* settings. Instead, just use the plus/tag every time you enter your address into an online form. Our favorite method is to use the name of the site you're visiting as the tag, so it's easy to track later on. So if you buy some vintage kicks at Raresneakers.com, enter your email address as username+raresneakers@gmail.com.

Gmail ignores the plus sign and everything that comes after it, so messages sent to that address will still make their way to you. But if that site sells your address to its spamifying associates, you'll know just by peeking at the To address in the header. How you choose to exact revenge is entirely up to you.

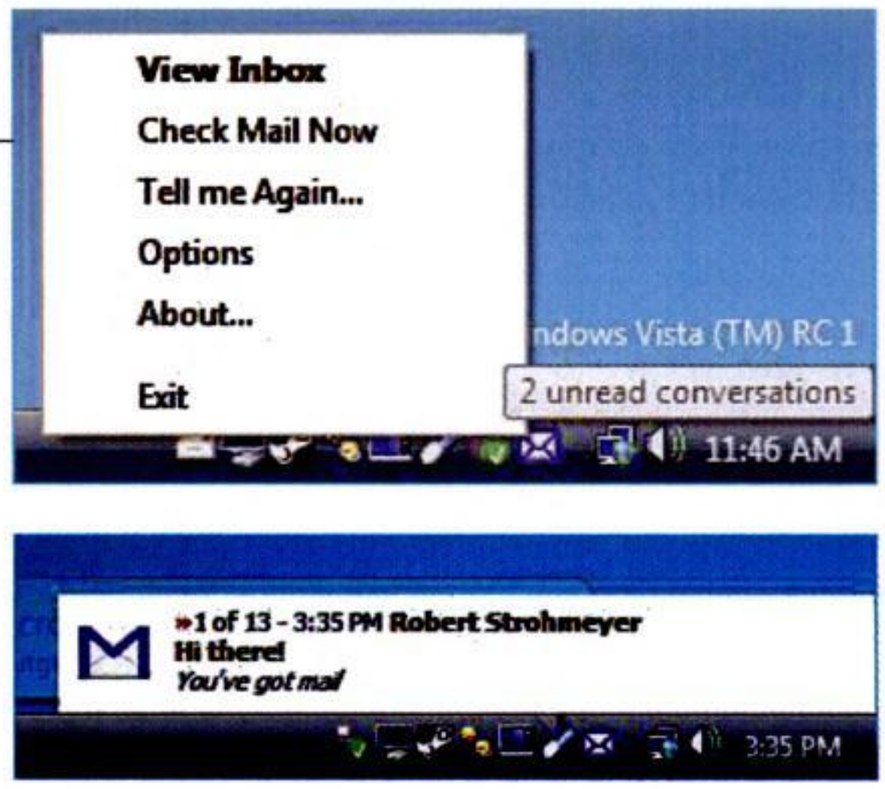
You can also use this tip to set up filters for registration codes, listservs, and anything else!

Sign In
What is your e-mail address?
My e-mail address is username+amazon@gmail.com
Do you have an Amazon.com password?
No, I am a new customer.
Yes, I have a password:
Sign in using our secure server
Forgot your password? Click here
Has your e-mail address changed since your last order?

You don't need special tools to track down spammers. Add a plus sign and a tag to your address when you fill out web forms to see who's selling your address.

3 Take Notice with a Notifier

You don't have to log into *Gmail* every time you want to see if you've got mail. Instead, download a *Gmail* notifier. Although it isn't prominently featured on the Gmail site, Google's own *Gmail Notifier* is a free download from **http://mail.google.com/mail/help/notifier/**. If you'd rather not install a system tray icon, you can always use a *Gmail* plugin for *Firefox*, which you can get from **http://addons.mozilla.org**. *Gmail Checker* is a low-profile plugin that requires barely a second thought to keep track of. But if you want to check multiple *Gmail* accounts from within Firefox, check out Gmail Manager.



***Gmail Notifier* lets you know when you've got mail, even when your browser is closed.**

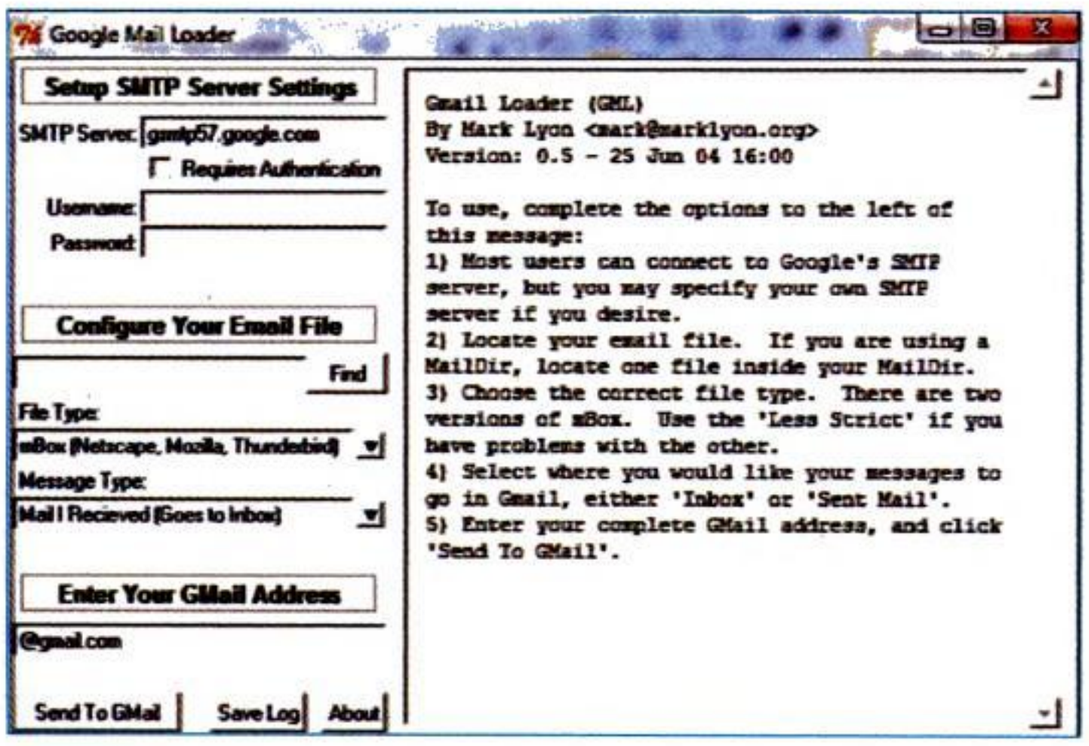
4 Import Your Old Mail into Gmail

If you decide to switch to *Gmail* completely, you'll probably want to bring your old contacts and messages along for the ride. Importing your contacts is easy (just click Import in the upper-right corner of the Contacts screen and select a CSV file exported from your old mail app). Importing your old email takes a little more doing.

One of the easiest ways to get your old mail into *Gmail* is to download Mark Lyon's *Gmail Loader* (aka *GML*), which you can download from **www.marklyon.org/gmail/**. This simple little utility will transfer messages in the mBox format (including *Thunderbird*, *Eudora*, and *Netscape* mailboxes) into *Gmail*. Transferring your mail is as easy as downloading the app, launching it, entering your *Gmail* login info, browsing for your mailbox folder, and clicking Send to Gmail.

To transfer *Outlook* mailboxes, try *Outport* (**http://outport.sourceforge.net**), which can transfer messages from *Outlook* to a host of other mail readers, including *Gmail*. Like *GML*, *Outport* has a fairly simple GUI that's easy to navigate, so you can get the job done quickly and with a minimum of mucking around.

Sadly, *Gmail* will stamp all the imported mail with the date on which you do the import, rather than preserve the original received


Google Mail Loader
Setup SMTP Server Settings
SMTP Server: gsmtp57.google.com
Requires Authentication
Username:
Password:
Configure Your Email File
Find
File Type:
mBox (Netscape, Mozilla, Thunderbird)
Message Type:
Mail I Recieved (Goes to Inbox)
Enter Your GMail Address
@gmail.com
Send To GMail
Save Log
About
Gmail Loader (GML)
By Mark Lyon <mark@marklyon.org>
Version: 0.5 - 25 Jun 04 16:00
To use, complete the options to the left of this message:
1) Most users can connect to Google's SMTP server, but you may specify your own SMTP server if you desire.
2) Locate your email file. If you are using a MailDir, locate one file inside your MailDir.
3) Choose the correct file type. There are two versions of mBox. Use the 'Less Strict' if you have problems with the other.
4) Select where you would like your messages to go in Gmail, either 'Inbox' or 'Sent Mail'.
5) Enter your complete GMail address, and click 'Send To GMail'.

***Gmail Loader* quickly rounds up your old email messages from *Thunderbird* and transfers them into your *Gmail* Inbox.**

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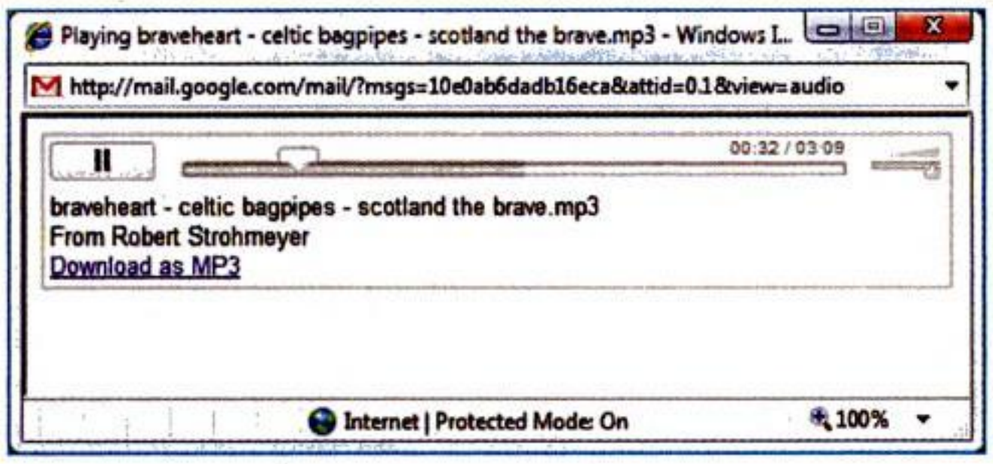
dates from each of your imported messages. However, you can still find imported messages by date, because the original received dates are retained within the body of the messages. So simply searching for "Nov 06" will help you find all messages from November of 2006.

5 Turn Gmail into an MP3 Player

In the interest of convenience, *Gmail* has its own built-in audio player for use with file attachments. You can put it to work as an online MP3 player by using labels and mail filters to sort your files.


Playing braveheart - celtic bagpipes - scotland the brave.mp3 - Windows I...
http://mail.google.com/mail/?msgs=10e0ab6dadb16eca&attid=0.1&view=audio
00:32 / 03:09
braveheart - celtic bagpipes - scotland the brave.mp3
From Robert Strohmeyer
Download as MP3
Internet | Protected Mode: On
100%

Need a music player in a pinch? *Gmail's* built-in audio player becomes a searchable music library with the addition of a filter and a label.

First, set up a label called MP3. Next, set up a filter that searches for MP3 content by clicking Create a Filter at the top of the screen. Enter "mp3" in the "Has the words" field and check the box marked "Has attachment." This will search for any messages with music files attached (including any you may have uploaded using the *GMail Drive Shell Extension* mentioned earlier). Now click Next Step and check the box marked "Apply the label" and choose the label MP3. Now any time you want to pump up some jams, you can click the MP3 label on the left side of your screen and pick a tune from the list.

6 Email Impersonator

Just because you've switched to *Gmail*, that doesn't mean you have to give up your old email address. *Gmail* lets you send messages that appear to come from another address. In the settings pane, click Accounts and then choose "Add another email address," then enter the address you'd like to use. To prevent you from ruining someone else's life by masquerading as them on the Internet, Google will send a test message to verify that the address belongs to you. Then you can choose to make that new address your default identity, so nobody needs to know that you're really sending from *Gmail*. To complete the transformation, set up a forwarder for your other address's account, so that all of your mail reaches your *Gmail* account. MPC

Settings
General Accounts Labels Filters Forwarding and POP Chat Web Clips
Forwarding:
Disable forwarding
Forward a copy of incoming mail to email address and keep Gmail's copy in the Inbox
Tip: You can also forward only some of your mail by creating a filter!
POP Download:
Learn more
1. Status: POP is enabled for all mail that has arrived since Sep 20
Enable POP for all mail (even mail that's already been downloaded)
Enable POP only for mail that arrives from now on
Disable POP
2. When messages are accessed with POP keep Gmail's copy in the Inbox
3. Configure your email client (e.g. Outlook, Eudora, Netscape Mail)
Configuration instructions
Cancel
Save Changes

You don't have to settle for an @gmail.com email address. Use the Account Settings screen to configure *Gmail* to use any address you like.

WARNING
EXTREME GEAR AHEAD!
Titan Amanda TEC (Thermoelectric) Heatpipe Cooler for Superior Air Cooling
NEW
Lian Li V-2100 Water Cooled Edition. Custom case with top view window that also doubles as the radiator grill. Includes two independent water cooling loops!
Razer Barracuda T HP-1 8-Channel Gaming Headphones with Great Sound!
Zalman Reserator 2 is a self contained External Water Cooling System with Style.
Optimus Mini Three is an auxiliary, keyboard programmable, OLED screens.
performance-pcs.com
Your best source on the Net for cutting edge computer modifications!

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Ask the Doctor

Diagnosing and curing your PC problems

PROMISES, PROMISES

I purchased an MSI Pro 266R Master R motherboard a few years ago to experiment with RAID configurations. I set up my drives in a RAID 0 configuration, in order to achieve faster access rates to the hard drives. As luck would have it, the motherboard was afflicted with the dreaded "blown capacitor issue," which soon rendered it useless and my highly valued digital photographs and other data inaccessible. I haven't been able to find this same model of motherboard, which used a Promise PDC20265R RAID controller, so I've been unable to retrieve my data. Can I use any motherboard with a Promise RAID controller? And before you say it: Yes, I know I should have backed-up my data.

—Michael Anderson

You have four options, Mike. The first is to buy an identical motherboard on eBay and recover your data. The second is to buy a motherboard that uses the same Promise chip. Just do an online search for PDC2026R, and you'll find a list of boards that feature that particular Promise controller. Because the chip is older, you'll probably have to purchase that part on eBay, as well. A third option is to try using RAID recovery software such as Runtime.org's *RAID Recovery* utility, which claims to be able to recover RAID 0 data if both drives are still functioning. The last option is to pay a professional data-recovery outfit to get the data for you.

GEE, THANKS, BUT…

I'm with the U.S. Army stationed in Iraq, and will be here for another nine months. My family recently gave me an HP DV8315 laptop, which is powered by a 1.8GHz AMD Turion 64. Applications run great, but the machine has issues with games. I upgraded the hard drive to an 80GB, 7,200rpm model from Hitachi, plus 2GB of memory from Crucial, but this hasn't appreciably impacted its gaming performance. I get significant frame lag even at 800x600 resolution. Do you think it would help to update the machine's drivers? What about adding a Sound Blaster Audigy 2 ZS notebook soundcard?

—Rick Anderson

HP actually has three DV8315 models: the DV8315ca, the DV8315nr, and the DV8315tx. The Doc doesn't know which one you have, but he feels confident enough to tell you there's not much you can do to improve the machine's gaming performance. Each of these models uses ATI's Radeon Xpress 200M chipset, which features an integrated graphics processor and

Adding a soundcard will make games sound better, and offload some work from the rest of the system, but it's not going to make up for an integrated GPU.

just 128MB of dedicated video memory. They aren't bad machines for productivity apps or web browsing, but they're just not designed to handle the steep graphical demands of today's games.

If you still want to upgrade your device drivers, you'll need to obtain them from HP. Even though they don't manufacture the components themselves, most mainstream notebook vendors—including Dell and HP—won't allow third parties to provide chipset or videocard driver updates for their mobile products. And we definitely don't recommend that you use generic ATI drivers, because that could cause all sorts of problems.

TWEAKED OVER TWEAKUI

*I store 90GB of digital music on an external USB drive. Following a tip I read in **Maximum PC**, I recently used **TweakUI** to reassign my My Music folder to that drive. Everything was hunky-dory until I shut down my PC and the USB drive when I went on vacation. When I returned, I started up the computer without first switching on the USB drive. That's where my problems began: Windows no longer displays My Music in its Start menu; and when I launch **TweakUI**, it no longer has an option to change the location of My Music. What's worse is that **iTunes** won't launch in the absence of a My Music folder, so now I can no longer transfer music to my iPod. How do I go about solving this problem? Can I edit the Windows registry, for instance?*

—Chris Kramer

Minor surgery on your registry is exactly what you need to do. It's a pretty simple procedure, too: Just fire up regedit by clicking the Start menu, choosing Run, typing regedit, and hitting Enter. Next, drill down to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Shell Folders (or possibly User Shell Folders). Change the entry for My Music so that it points to %USERPROFILE%\My Documents\My Music. Restart your computer and My Music should be back in its default location.

MY SOUNDCARD IS TOO QUIET

My new Creative Audigy 2 Value doesn't work with the EAX sound effect. Whenever I enable it, I get no sound from the game. My old onboard soundcard has no problem with EAX. What can I do to get my Audigy 2 to work with EAX? Please help.

—James Zeng

This could be the result of a conflict between your onboard audio and your PCI Audigy 2. First make sure the onboard audio is disabled in your system's BIOS. Just reboot, and hit F2 or the Delete key while the system starts. Poke around in the BIOS and look for something along the lines of integrated or onboard peripherals. Disable onboard audio, HD audio, or AC97 audio. Save your changes, reboot, go into Windows, and uninstall any applets or drivers for the onboard audio. Finally, go to Creative Labs' website, obtain the latest drivers for your soundcard, and install them.

GOING OUT TO PASTURE

*I have an out-of-warranty Alienware computer, circa 1999, that's running Windows ME. I'm ready to order a new one and plan to relegate this one to my wife's office, where it will be used to surf the web. But what happens if its hard drive ever goes belly up or Windows ME becomes corrupted? This happened once before, which required me to reload the image from Alienware's **Respawn** recovery disc. Microsoft was still supporting Windows ME at that time, so I was able to download and reinstall all the latest OS patches and updates. What would I do now that Microsoft has ended that support?*

—Mark Snyder

Continuing to run this machine on Windows ME could leave it vulnerable to hackers, because Microsoft is no longer fixing newly discovered security exploits associated with that OS. It might be worth your while to upgrade the machine to Windows XP, which Microsoft will likely support for the rest of the machine's useful life. If you don't want to go that route, you could create a backup image of your hard drive, using a program such as Symantec's *Norton Ghost*. Although

Continued on page 62→

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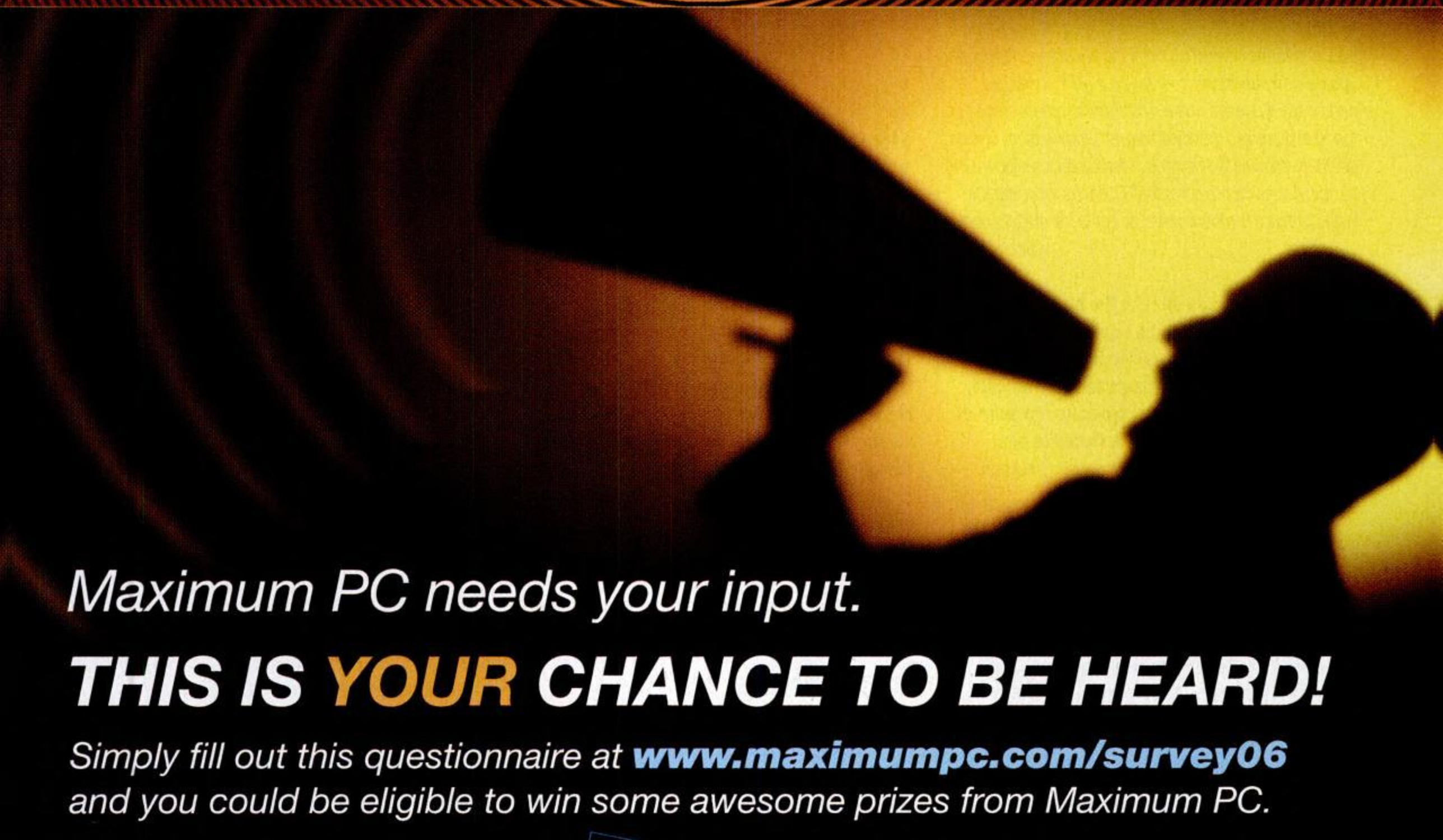
MAXIMUM PC READERS

SOUND OFF!

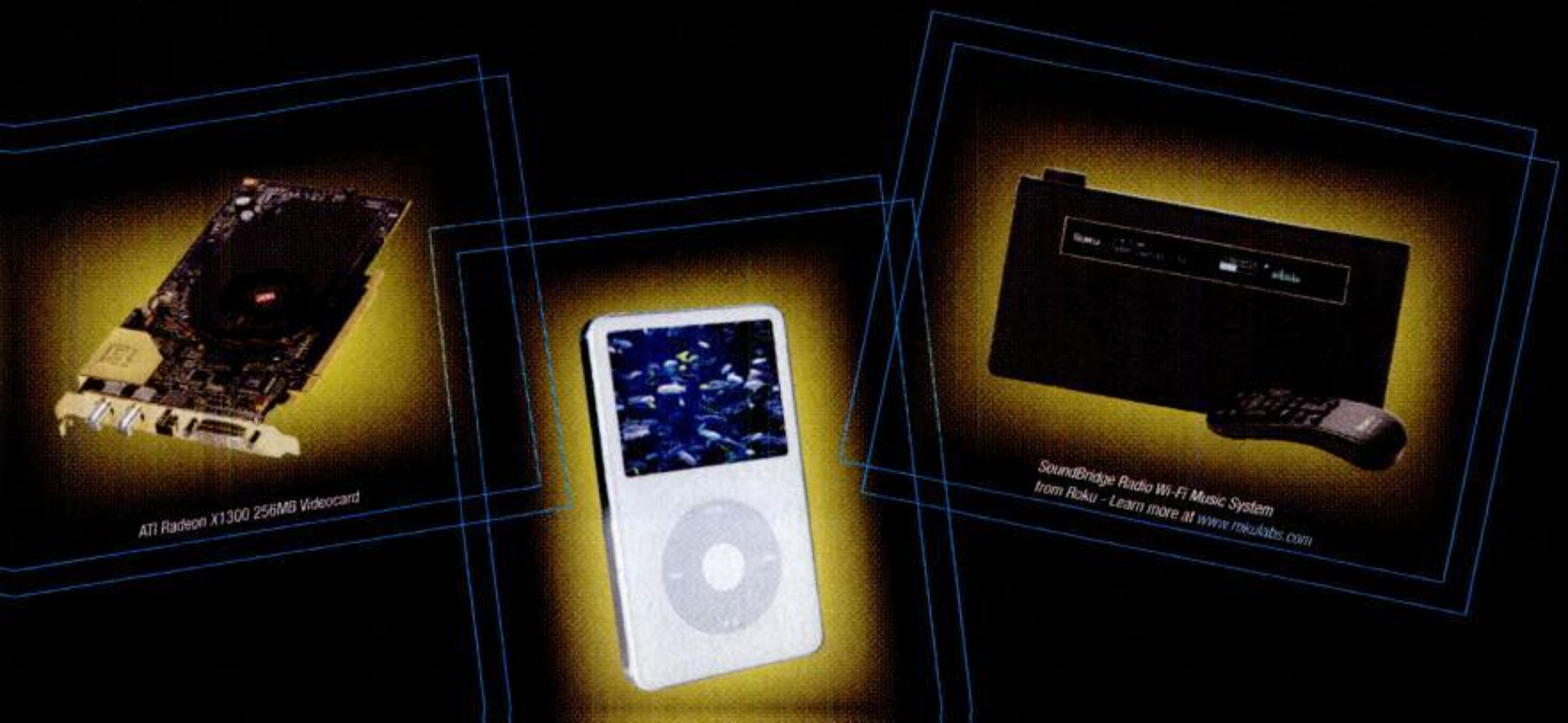


Maximum PC needs your input.

THIS IS YOUR CHANCE TO BE HEARD!

Simply fill out this questionnaire at ***www.maximumpc.com/survey06***

and you could be eligible to win some awesome prizes from Maximum PC.



If you want a chance to win an ***ATI Radeon X1300 256MB videocard*** *or a* ***30GB Video iPod*** *or a* ***SoundBridge Radio Wi-Fi Music System*** *or a ton of today's hottest games from THQ and CDV, please complete the survey by December 10, 2006 to be eligible for prizes.*

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No purchase necessary. As a contestant or survey participant, you

Ask the Doctor

Continued from page 60

the most recent version, *Norton Ghost 10*, does not support Windows ME, Symantec includes a copy of *Norton Ghost 2003* in the box, which does. This would not only ensure that you have a backup of an updated and patched version of Windows ME, it would also enable you to restore your entire working environment after a disaster. Either way, you should also back up any documents, digital photos, or other files stored on this machine, on a regular basis.

PUT THAT IN YOUR PIPE AND SMOKE IT

All these new mobos outfitted with heat pipes are great, but I'm hearing conflicting opinions about mounting them upside down in these new reverse-ATX cases. Some people say it doesn't make a difference; others claim that the heat pipes are gravity driven, so flipping them upside down diminishes their effectiveness and raises operating temps. Are hardcore reverse-ATX cases incompatible with hardcore motherboards, or is the karma all good?

—Scott Briggs

The answer depends on how the heat pipe is designed. Some need to be oriented a particular way; others don't. Your choice of chipset is also a factor. Intel and ATI chipsets tend to run cool, while Nvidia's nForce chips typically run warmer. And some of the problems attributed to heat pipes might actually stem from other sources.

The Doctor has heard enough noise about motherboards that use heat pipes to cool their chipsets that he doesn't recommend installing them in reverse-ATX cases.

When manufacturers first began shipping passive heat-pipe mobos, they assumed the do-it-yourself crowd would continue to use CPU fans, the cooling effects of which would spill over to the chipset and heat pipe.

In reality, many enthusiasts choose heat-pipe designs so they can water-cool their CPUs in order to build quiet machines. A CPU water block won't do anything to reduce the temps of a heat pipe or chipset. Having said all that, however, the Doctor has heard enough about issues with inverted heat-pipe motherboards that he thinks there could indeed be a problem.

BUT I'M NOT DEAD, YET!

***Maximum PC** editors keep telling us the current crop of videocards will be rendered obsolete when videocards featuring DirectX 10 are released. I read your magazine because I am a **Photoshop** user, and I like to keep up with and/or have the latest, greatest technology to speed photo processing and file transfers. I'm not a gamer and never have been.*

*How will the gloom-and-doom arrival of DirectX 10 affect me? I have a five-year-old dual Pentium III Xeon workstation with a Matrox Millennium G450, and I bought a dual Pentium 4 Xeon workstation with an Nvidia Quadro FX 540 last spring. I've been shopping for a Quadro FX 4500, and prices are dropping, but now I'm scared to buy. Because I'm just a **Photoshop** user, will it be necessary to have a DirectX 10 capable videocard?*

—Raymond Kirsteins

My videocard-reviewing colleague's enthusiasm about Direct3D 10's impact on the market might have led him to unintentionally overstate the obsolescence factor of today's videocards. You must have Windows Vista and Direct3D 10 hardware (which doesn't exist as of this writing) to get any of the benefits of Direct3D 10 software (including games and other programs that take advantage of Shader Model 4.0); however, that does not mean you must have Direct3D 10 hardware to run Windows Vista. The high-end version of Vista's new user interface, Aero Glass, requires only Direct3D 9.0 hardware.

The fact that *Photoshop* is your primary PC application renders the debut of Direct3D 10 even less of an event, because the current version doesn't rely on even Direct3D 9.0. This could change if Adobe releases a new version of *Photoshop*, but the company has historically been extremely conservative when it comes to changing *Photoshop's* fundamental code. Your dual-Pentium III Xeon system, on the other hand, is likely ready for retirement; and Nvidia considers the Quadro FX 540 card in your other system to be an "entry-level" workstation videocard, so it might behoove you to upgrade it to obtain a good experience with Windows Vista.

PRAISE THE PRINTER!

I work for a church and our new pastor wants to set up his printer across the room all by itself in a cabinet for printing. We do not have any wireless hubs or networking; everything is wired. Is there a way to set the printer up to receive wireless print jobs only from the pastor's laptop or desktop PC?

—Dodd Allee

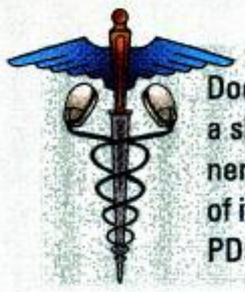
If you don't want to set up a wireless network, your best alternative would be to install a Bluetooth printer adapter on the printer. If one or both of your pastor's computers aren't equipped with Bluetooth, you'll also need an adapter for that machine. A USB-to-Bluetooth adapter would be best, so you could transfer it from machine to the other, as needed. These types of products are commonly available from network-equipment manufacturers such as Belkin, D-Link, and Linksys. MPC

SECOND OPINION

In your November 2006 column, reader Ralph Urrea asked about the best procedures for hosting multiplayer games on a PC. He also asked if there were any books or websites that explained this process. Your answers were correct, but I thought Ralph might also like to know about a couple of websites dedicated to the topic of hosting game servers.

As one of the moderators at FPSAdmin.com, I recently wrote a tutorial explaining how to set up dedicated *Call of Duty* and *CoD2* servers behind firewalls. Although these tutorials apply to specific multiplayer games, the principles can be applied to just about any gaming server. Each of the moderators on this site is a game-server admin, and we've been doing this stuff for years. We can help Ralph—and other *Maximum PC* readers—get a server up and running quickly and properly, so they don't need to constantly monitor and defend themselves from crackers. I've also found PortForward.com to be a good resource for help configuring routers and firewalls.

—Doug "OldDog" Murphy



Does your PC have a difficult time focusing on tasks? Has it developed a short temper? These could be the tell-tale signs of an oncoming nervous breakdown. The Doctor can help. Send a detailed description of its symptoms to doctor@maximumpc.com. He'll consult his digital PDR and devise a treatment plan, stat.

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Life is quieter with Zalman

ULTIMATE PERFORMANCE ULTRA QUIET CPU COOLER CNPS9700 LED

The More Powerful CNPS9700 LED with Increased Size and Performance

CNPS9700 LED fully supports the new Intel Core2 Duo and AMD Athlon 64 X2 Dual Core CPUs. It has been upgraded with the best cooling performance acquired with greater dissipation area and Super Thermal Grease ZM-STG1.

Fatal1ty Champion Case

FC-ZE1

The FC-ZE1 is a gamers' PC case equipped with black aluminum, red LED, and a friendly design for easy assembly and use.

Heatpipe Cooled
600Watt Modular Power Supply

ZM600-HP

The ZM600-HP is a power supply equipped with high performance heatpipes that maximize cooling performance and modular cables that enhance user friendliness.

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White Paper: Antialiasing

How videocards fit an analog curve into the square digital world.

BY GORD **GOBLE**

HOW IT WORKS **Multisampling: before and after**

ALIASED

Because lines that are near-vertical or near-horizontal can't be drawn using the grid of pixels that PCs use to render images, they frequently appear stair-stepped, as shown here.

ANTIALIASED

Using multisampling, the GPU renders trouble areas at a higher resolution, then outputs the resultant bits at the appropriate resolution to render much smoother-looking lines.

Videocards wouldn't be all that interesting if each new generation delivered only faster frame rates—we also expect them to render video and graphics that look more realistic. Antialiasing is one tool that videocard developers use to achieve that objective. To fully understand antialiasing, and the numerous antialiasing techniques in use today, we first need to identify antialiasing's prey: aliasing. And to do *that*, we need to take a quick look at display technology.

LCD is the most popular display technology in use these days, so we'll use that as our example; but the basic principles are similar whether you're talking about CRT, OLED, or DLP. Each of these displays creates an image using pixels; the pixels in an LCD computer monitor are perfectly square, with four 90-degree corners. There are millions of them in even a moderately high resolution display—1280x1024, for instance—arranged in perfectly ordered rows and columns. Each pixel consists of three subpixels—one red, one green, and one blue—arranged side by side by side. Each subpixel is capable of producing 256 levels of brightness via regulated voltage changes. Multiply 256 levels of red by 256 levels of green by 256 levels of blue and you arrive at the now-familiar palette of 16.8 million colors.

STAIR-STEPPER

Objects consisting exclusively of 90-degree angles, such as squares and rectangles, look great on pixel-based monitors because they fit perfectly into the display's graph paper-like grid system. Unfortunately, such orderly shapes are relatively unusual in nature; and computer displays have much more difficulty rendering the curvaceous lines that are common in the real world. Pixels are fixed in size and must be filled—you can't illuminate a fraction of a pixel—so curved or diagonal lines and spherical objects inevitably appear to have jagged edges wherever groups of pixels lie outside what should be the object's boundary.

If those edges are especially thin, they take on a sparkly appearance; if they're part of an animated or moving object, they tend to shimmer. These and similar undesirable artifacts are known as aliasing, and they're the bane of gamers, graphic artists, and animators.

Fortunately, techniques exist to combat aliasing and cure the "jaggies" by fooling the human eye into perceiving the edges of digitized curves to be as smooth as the proverbial baby's bottom. These antialiasing software routines are typically executed by your videocard's GPU.

In a nutshell, antialiasing renders more pixels in an effort to simulate the fill-in effect that smaller pixels would have on the lines. Because the GPU can't actually create smaller pixels, it simulates them by altering the shading or coloring of individual pixels on either side of the line to create a smoother, more natural appearance. If the object's outline is black and the background is white, for example, antialiasing will arrange pixels with intermediate color values along the edge to soften the transition. The effect isn't perfect, as you'll see if you zoom in on the object in question, but it's far better than nothing at all.

Antialiasing in 3D graphics processors has taken a variety of forms since 3Dfx shook up the gaming world with the introduction of full-screen antialiasing (FSAA) at the turn of the millennium. Back then, "supersampling" was the most common AA technique. In supersampling, an entire frame is rendered inside the GPU at several times the resolution at which it will be ultimately displayed. If the resolution is quadrupled, for example, each displayed pixel will correspond to four off-screen pixels. These extra pixels are then sampled and colored based on the average color values of the pixels surrounding them. When the image is scaled down and sent to the display, the edges along curved lines appear smoother.

Supersampling is highly effective, but it's also extremely memory-bandwidth intensive. This wasn't a problem when typical display resolutions were 640x480 or 800x600 and graphics processors were expected to process pixels numbering in the hundreds of thousands, but even today's most powerful GPUs can't perform supersampling at high frame rates when multiple millions of pixels are involved.

EFFECTIVE COMPROMISES

In order to reduce the crushing workload on the videocard, engineers have developed a more efficient AA technique known as multisampling. The key distinction between multisampling and supersampling is that multisampling samples only the pixels that exist along the edges of objects, as opposed to the entire display area. An algorithm determines how much of each pixel resides within and outside of the boundaries of each object and then

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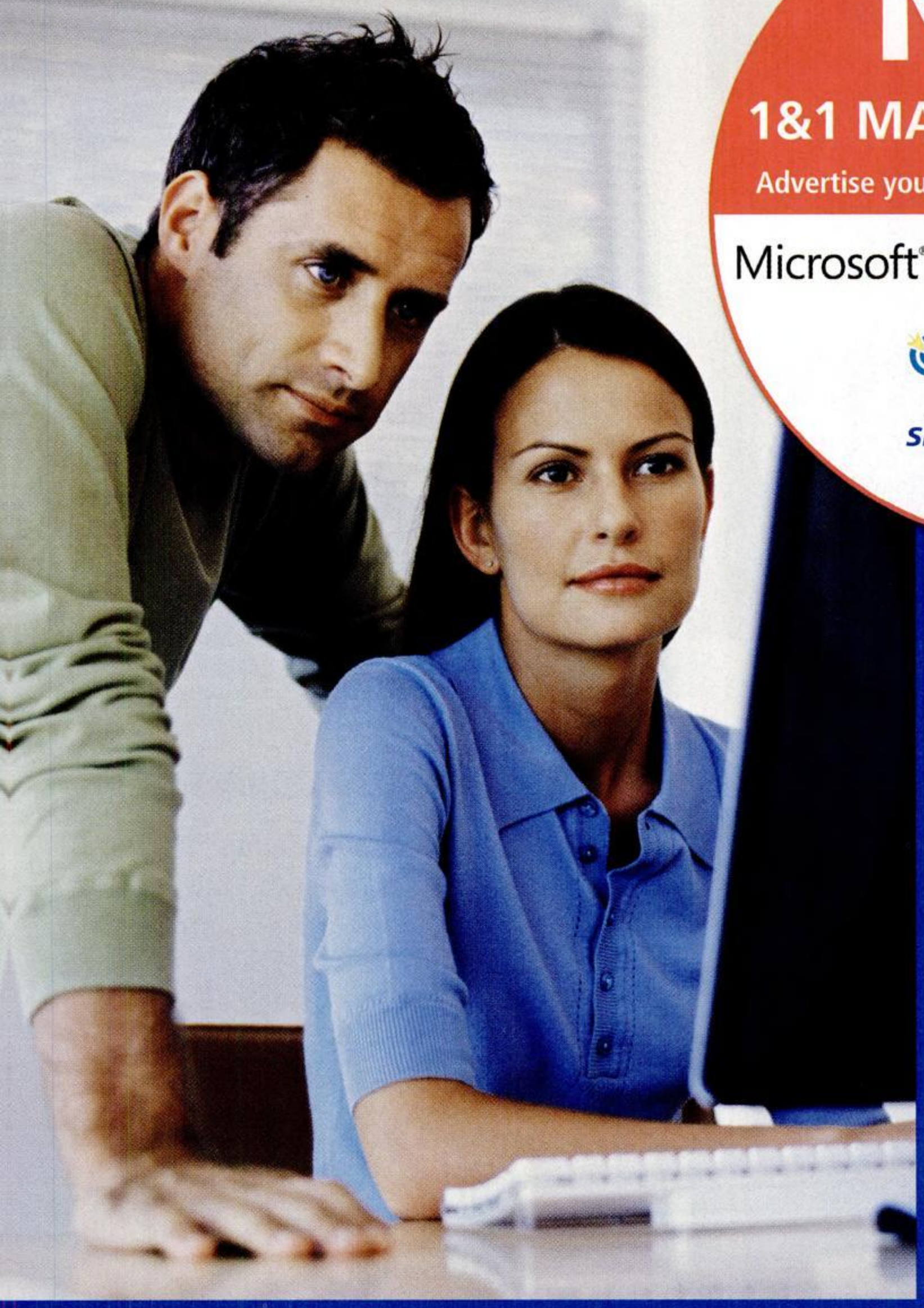
1&1 – The Total Solution for Your Web Hosting Needs



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Advertise your business and acquire customers

Microsoft® adCenter

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Simple Submission

3 steps to becoming successful on the web:

1. Easily build your website
2. Increase visitors and acquire customers
3. Communicate with your visitors

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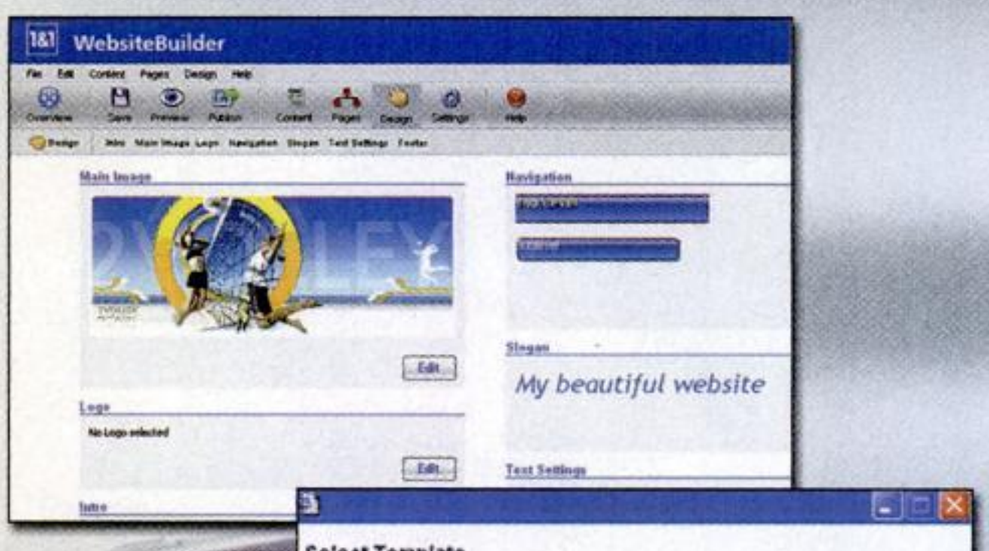
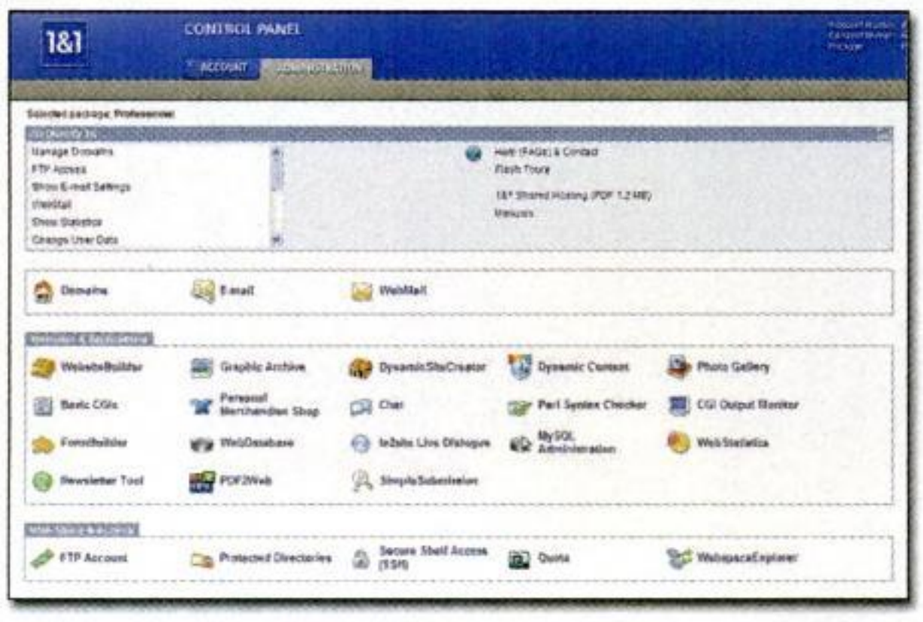
Step 1: Easily build your website



Web design from beginner to advanced …

1&1 knows that the best websites start with the best tools available. That's why we offer a wide range of powerful features and enhancements to suit your level of expertise and help you create a successful presence on the web.

Whether you're a novice user or a veteran online professional, the 1&1 Software Suite and WebsiteBuilder give you the power to create a high-impact, professional website. No matter which you use, we give you exactly what you need to easily, effectively and economically make your presence online.



1&1 WebsiteBuilder

Create your website in 4 easy steps.

1&1 WebsiteBuilder lets you design a professional-looking website with no HTML knowledge.

Let the wizard guide you through the process. Included with all shared hosting plans. Using our simple point-and-click prompts and built-in text editor, your site can be online in minutes. Creating a website has never been easier.

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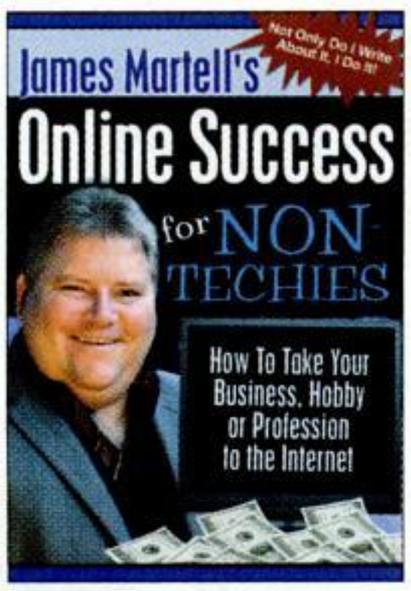
Step 2: Increase visitors to your

Drive traffic to your website with 1&1!

1&1 Shared Hosting packages provide you with everything you need to increase visibility and traffic to your website.

Our shared hosting packages now offer user-friendly technology to help increase the flow of visitors to your website. Improve the visibility of your business on the web with special search advertising offers that help you connect with prospective customers looking for your product or service. Advertise locally with the leading local search service, and gain valuable knowledge from an informative online success manual.



Online Success for Non-Techies

Learn how to quickly and easily develop a successful website for your business, hobby or profession that ranks highly on the major search engines. This informative book by successful Internet entrepreneur James Martell is included with your 1&1 shared hosting package.

Google Webmaster Tools

Facilitate discovery of your website

Create a sitemap for free with Google Webmaster Tools via your 1&1 Control Panel. Sitemaps is a web developer tool that provides Google with up to date information to crawl your website faster and more efficiently. Enable easy discovery of information on your site and improve the search experience of your visitors.

Simple Submission

Register your website

1&1's Simple Submission automatically submits 2 URLs to major search engines on a monthly basis. Try our upgraded version for a free 90 day trial to analyze your keywords, monitor your site's ranking, compare your site to the competition and so much more. Take your site to the next level.

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site and acquire customers

Microsoft® adCenter

Increase your visibility

Reach potential customers by advertising with **Microsoft® adCenter**. *Search advertising* is considered by many businesses as their secret weapon. Your 1&1 vouchers, up to $200*, help you target your ads to the times, places, and customers you want. Use built-in tools to get keywords ideas, audience information, and detailed reports.

Google AdWords®

Advertise your business

Promote your business and acquire customers easily with Google AdWords®. Select keywords that relate to your business and set up your ad in minutes. Make it easy for prospective customers to find your business when they search on Google. With this special offer** from 1&1, it's easier than ever to get started.

Citysearch

Advertise locally

Get listed on Citysearch, the leading local search service. Sign up for any 1&1 shared hosting package and get 12 months of listing free! You'll also receive a pay for performance voucher worth up to $100. Choose your desired sales categories and keywords, set and control your monthly expenditure, and start receiving traffic to your site today.

* Offer valid for a limited time for advertisers opening a new U.S. Microsoft® adCenter account. Minimum $5 sign-up fee required and other terms and conditions apply. See www.1and1.com. Microsoft is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

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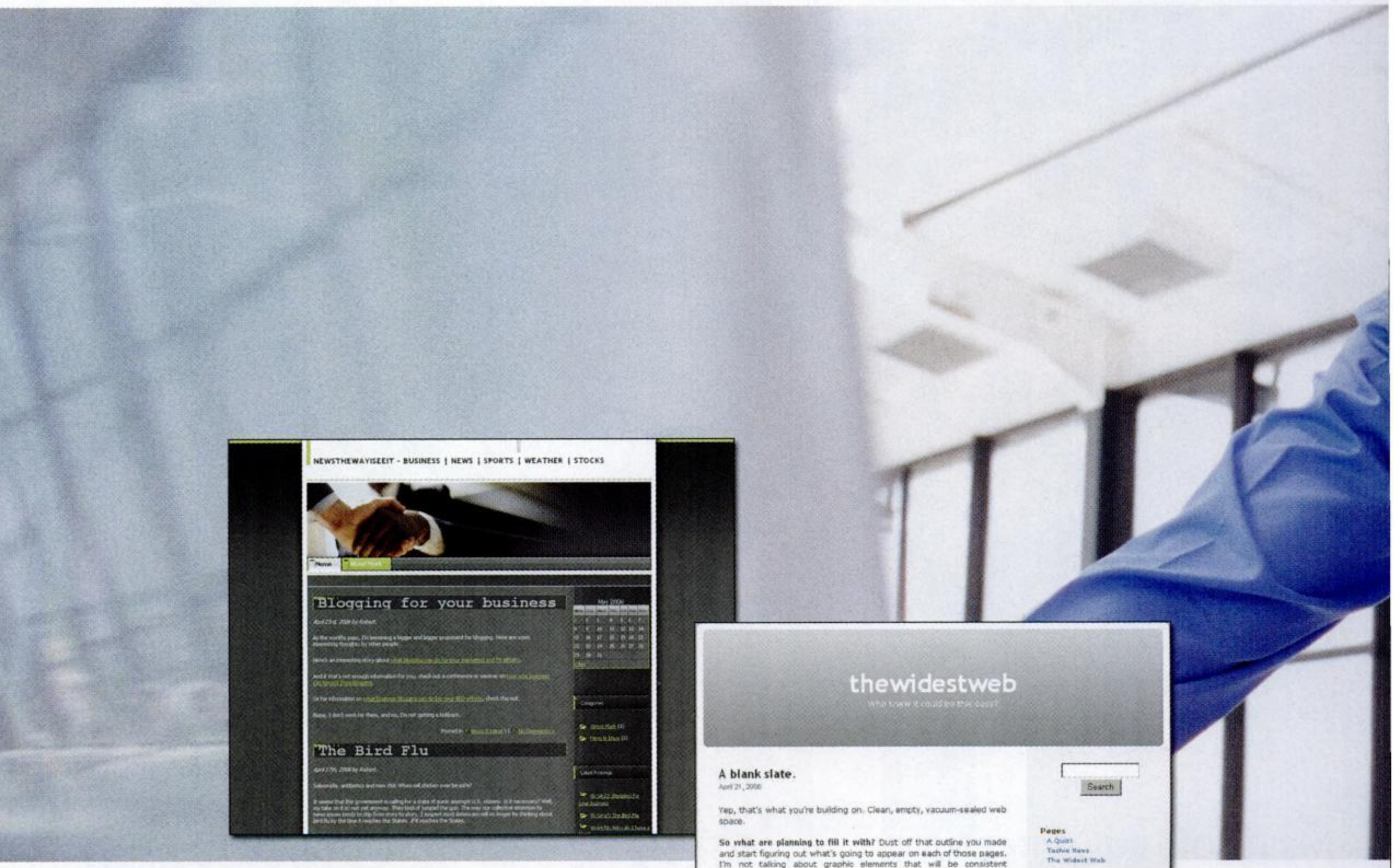
Step 3: Communicate with your



Stay in contact with your visitors

1&1 gives you the tools to effectively communicate with your customers and site visitors, keeping them intrigued and coming back for more.

Your 1&1 shared hosting package comes complete with high-performance features that let you connect with your visitors through live interaction, blog entries, e-mail newsletters and more. Best of all, these tools are so easy to use that no programming knowledge is needed.

Not available with all packages, see 1and1.com for details

1&1 Blog

Share your ideas with the world

Start your own blog today. This personal publishing medium is included free with all Linux shared hosting packages and is a great way to share your thoughts, activities, developments or interests on a regular basis. An out-of-the-box solution, your weblog can be installed in two minutes and with no programming skills.

Not familiar with what a blog can do for you?
Check out our sample blogs:

www.newsthewayiseeit.info

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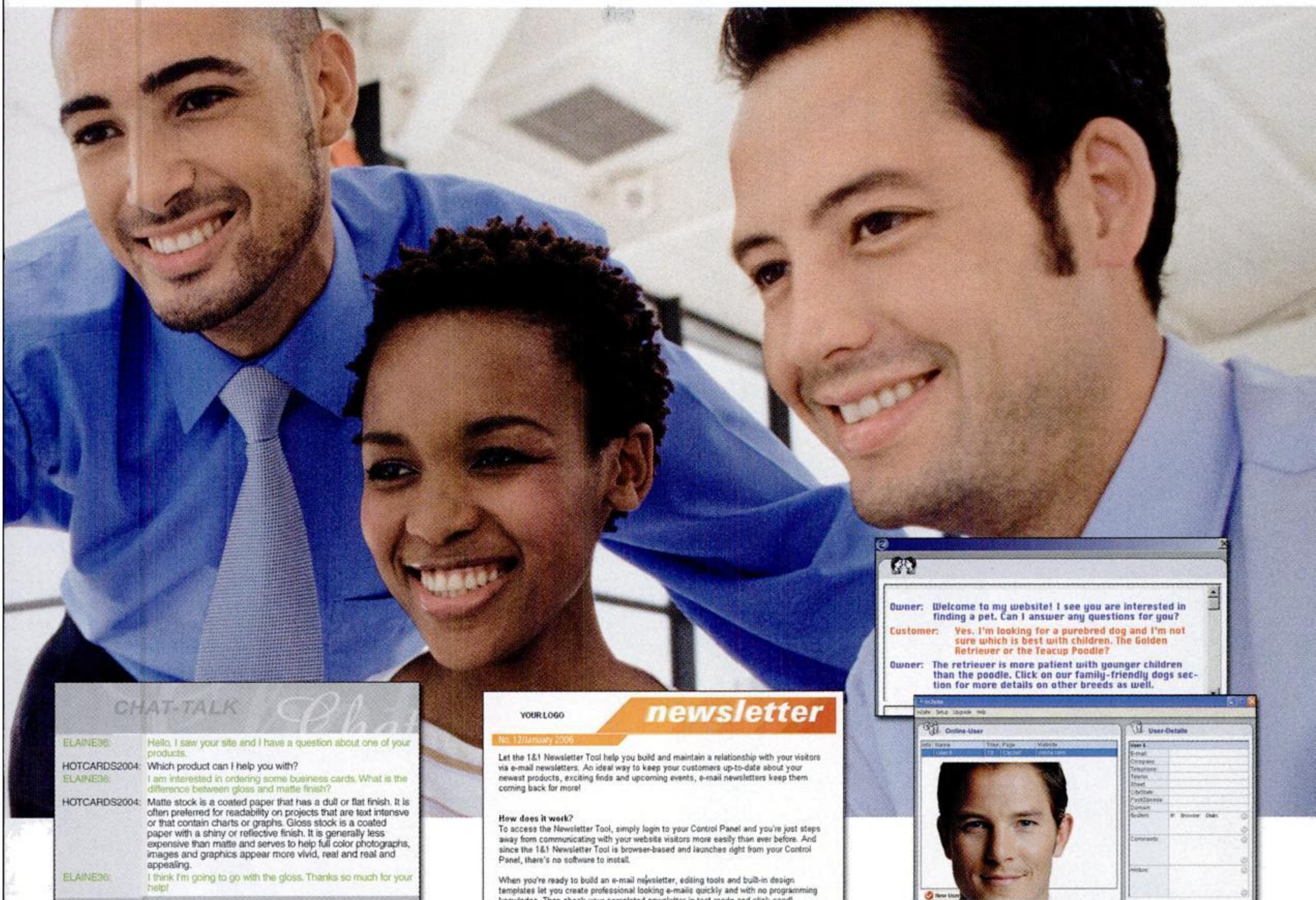
visitors


CHAT-TALK
ELAINE96: Hello, I saw your site and I have a question about one of your products.
HOTCARDS2004: Which product can I help you with?
ELAINE96: I am interested in ordering some business cards. What is the difference between gloss and matte finish?
HOTCARDS2004: Matte stock is a coated paper that has a dull or flat finish. It is often preferred for readability on projects that are text intensve or that contain charts or graphs. Gloss stock is a coated paper with a shiny or reflective finish. It is generally less expensive than matte and serves to help full color photographs, images and graphics appear more vivid, real and real and appealing.
ELAINE96: I think I'm going to go with the gloss. Thanks so much for your help!
Thanks so much for your help!
send
YOUR LOGO
newsletter
No. 12/January 2006
Let the 1&1 Newsletter Tool help you build and maintain a relationship with your visitors via e-mail newsletters. An ideal way to keep your customers up-to-date about your newest products, exciting finds and upcoming events, e-mail newsletters keep them coming back for more!
How does it work?
To access the Newsletter Tool, simply login to your Control Panel and you're just steps away from communicating with your website visitors more easily than ever before. And since the 1&1 Newsletter Tool is browser-based and launches right from your Control Panel, there's no software to install.
When you're ready to build an e-mail newsletter, editing tools and built-in design templates let you create professional looking e-mails quickly and with no programming knowledge. Then check your completed newsletter in test mode and click send!
We even include tools to build your own mailing list! Simply incorporate a template-driven subscription form on your site so interested visitors can quickly request to receive your e-mail newsletters. Once the form is submitted, the data is automatically entered into a
Owner: Welcome to my website! I see you are interested in finding a pet. Can I answer any questions for you?
Customer: Yes. I'm looking for a purebred dog and I'm not sure which is best with children. The Golden Retriever or the Teacup Poodle?
Owner: The retriever is more patient with younger children than the poodle. Click on our family-friendly dogs section for more details on other breeds as well.
Online-User
User-Details
New User
Chat window
Chat request
1&1
in2site

Chat Channels

Connect with visitors from all over the world

Provide a meeting place for your visitors to come together and talk. Unlike other chat programs, Chat Channels requires no software downloads, so people can check in from anywhere in the world and communicate freely, without the distractions of advertisements.

E-Mail Marketing Tool

Maintain relationships with your visitors

Build and maintain relationships with your visitors via e-mail newsletters with our E-mail Marketing Tool. Create and send professional looking e-mails – easily and with no programming hassles! Build your own mailing lists, manage recipients' addresses, track results and more.

In2site Live Dialogue

Converse with visitors – live and in real time

Receive notification as soon as someone visits your site. Observe your visitors' behavior or communicate with them instantly. Use this information to help you maximize your site's potential. In2site Live Dialogue is an ideal tool for sales, support and consulting professionals.

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Build your personal website. Ideal for creating an attractive Internet presence for your family or hobbies, the 1&1 Home Package includes everything you need to make your mark on the web. Our Home Package offers an exceptional value for your money.

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FREE Starter Software Suite*

A $700 value!

1&1's Starter Software Suite gives you everything you need to create, publish, promote and optimize a successful online presence. This exclusive bundle features our new GIF Animator 5, NetObjects Fusion 8, PhotoImpact 11 SE, search engine placement tools and much more.

*If you choose to receive the Starter Software Suite, you must commit to a one-year contract for the package you choose. $6.99 shipping & processing fee applies.

1&1 Photo Gallery

Create an online photo album!

Add an online photo album to your website, quickly and easily. Choose from several eye-catching styles, select your favorite color scheme and layout, then import and organize your photos. Create slideshows with fade-in/fade-out transitions, background music and other professional effects. Now with more layouts, more sounds, more colors and adjustable sizes.

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Web Space	100 GB	5 GB	100 GB
Monthly Transfer Volume	1,000 GB	200 GB	1,000 GB
E-mail Accounts	1,000 IMAP or POP3	200 POP3	1,000 POP3
Mailbox Size	2 GB	2 GB	10 MB
Search Engine Submission	✓	✓	Extra charge applies
Website Builder	12 Pages	✓	Freeware
Flash Site Builder	12 Pages	–	–
Photo Gallery	✓	✓	✓
RSS Feed Creator	✓	–	$4.99/month
Blog	✓	✓	$2.99/mo. For ad-free blogs
Geographic Map	✓	✓	–
Dynamic Web Content	✓	✓	–
Web Statistics	✓	✓	✓
Chat Channels	✓	–	✓
Starter Software Suite	✓	–	–
90-Day Money Back Guarantee	✓	–	–
Support	24/7 Toll-free Phone, E-mail	24/7 Toll-free Phone, E-mail	24/7 Phone, E-mail
Price Per Month	$4.99	$11.95	$6.99

Vouchers included

Microsoft® adCenter*	$50 value
Google AdWords*	$25 value
Citysearch	$25 value

*See terms on page 6 for details.

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DynamicSiteCreator

Take your site from ordinary to extraordinary

Exclusively from 1&1, the DynamicSiteCreator lets you build a professional-looking flash site in minutes, without the need for a professional programmer or web designer. Easily accessible through the 1&1 Control Panel, this flash animation tool takes your site to a new level with animated graphics, interactive menus and sound.

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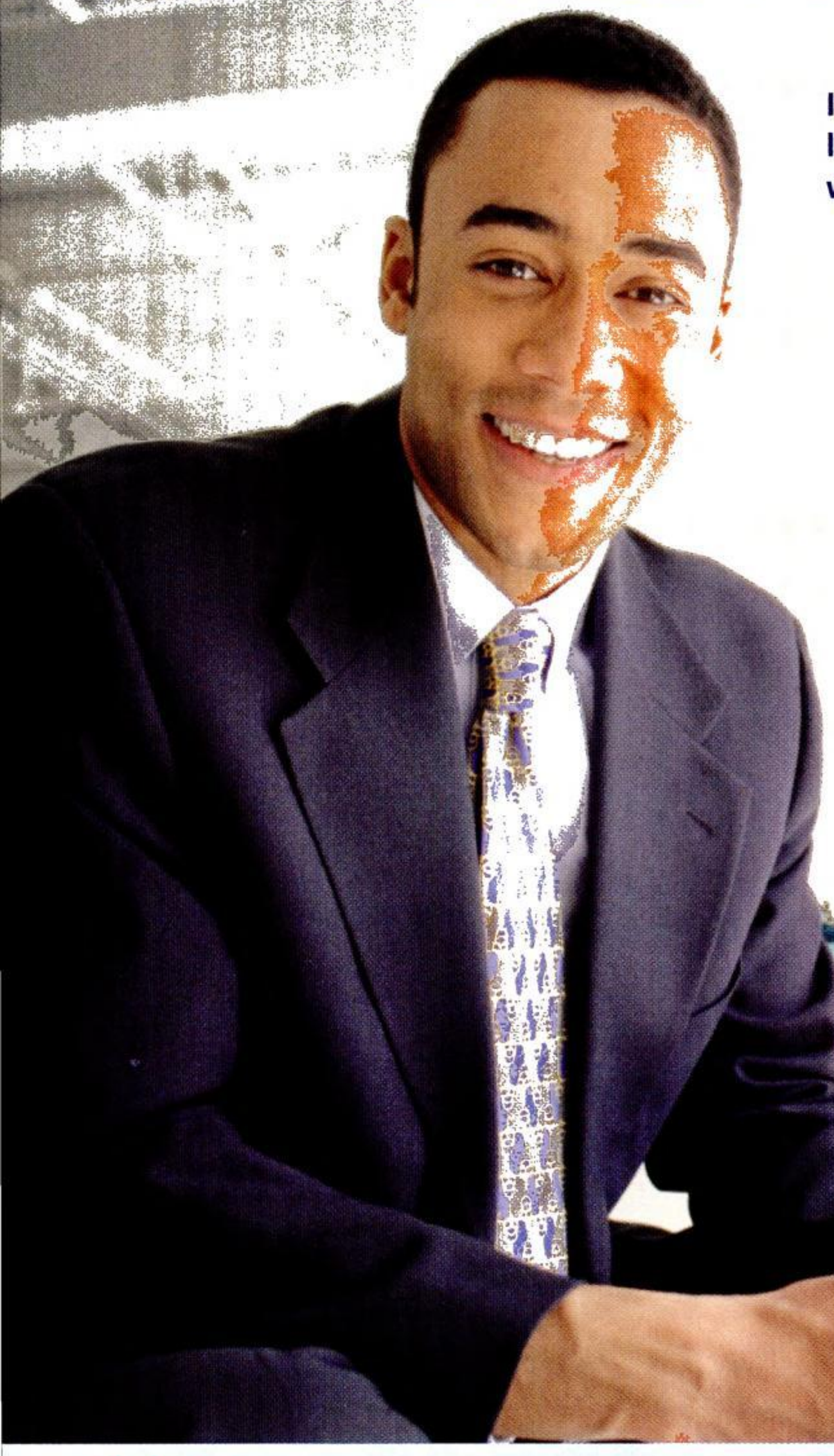
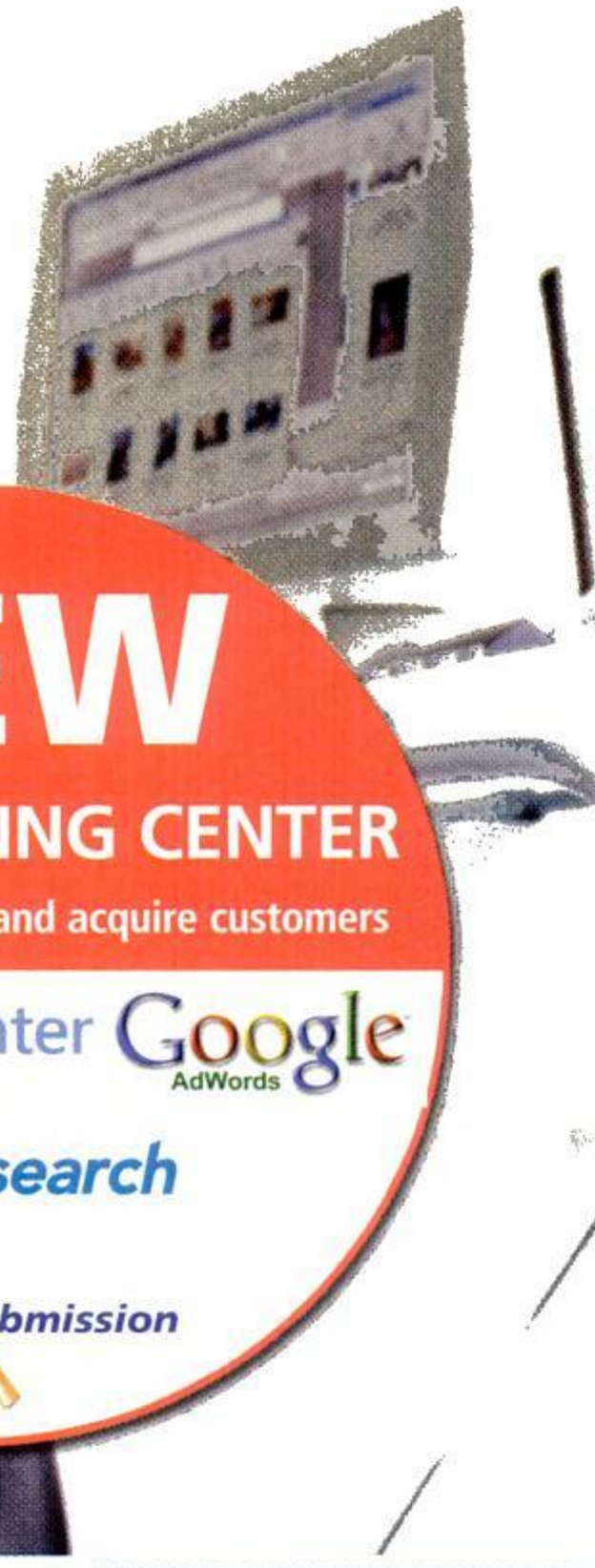
If you run a small to medium-sized business and are looking to easily build a professional, interactive website, the 1&1 Business Package is your solution.





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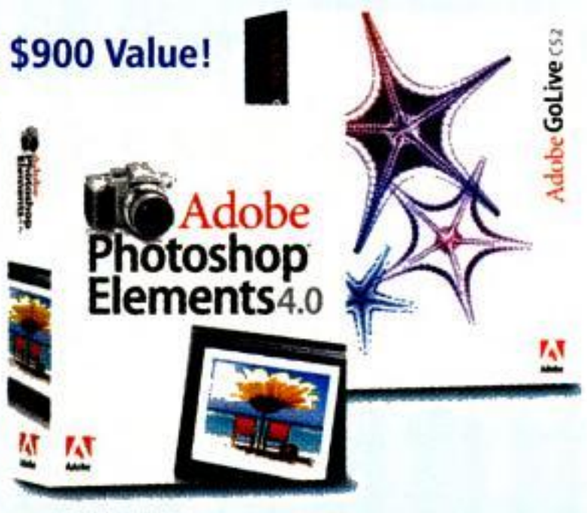
Receive the latest in Adobe design software with our Premium Software Suite. Included with all Business and Developer Packages.



*If you choose to receive the Premium Software Suite, you must commit to a one-year contract for the package you choose. $6.99 shipping & processing fee applies

1&1 Dynamic Content Catalog

Add real-time web content!

Enrich your site with real-time news and fresh web content with a wide range of topics such as news headlines, business reports, sports highlights, travel destinations, online games, weather forecasts and more. Integration is easy, no HTML knowledge is required, and thanks to automatic updates, your content is always current and completely maintenance-free!

Lomu set for Cardiff debut
©AFP/File
CARDIFF (AFP) - New Zealand rugby legend Jonah Lomu is set to make his debut for Cardiff Blues against Italian side Calvisano in the Heineken European Cup on December 17.
Injury agony getting to Owen
©AFP/File
NEWCASTLE, England (AFP) - Michael Owen has insisted that his recent injury problems will not prevent him from playing a full part in
27th August 2006
Temperature:
24°
Weather:
hot, sunny spells
Wind:
5mph
Wind Direction
NW
Chance of Precipitation
25 %
UV Index:
4
Sunrise/Sunset:
6:27 AM/7:55 PM

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Web Space	200 GB	10 GB	200 GB
Monthly Transfer Volume	2,000 GB	400 GB	2,000 GB
E-mail Accounts	2,000 IMAP or POP3	500 POP3	2,000 POP3
Mailbox Size	2 GB	2 GB	10 MB
Search Engine Submission	✓	✓	Extra charge applies
Website Builder	18 Pages	✓	Freeware
Flash Site Builder	18 Pages	–	–
Photo Gallery	✓	✓	✓
RSS Feed Creator	✓	–	$4.99/month
Blog	✓	✓	$2.99/mo. For ad-free blogs
Map & Driving Directions	✓	✓	–
Dynamic Web Content	✓	✓	–
Web Statistics	✓	✓	✓
E-mail Newsletter Tool	✓	$10/month	$3.99/month
In2site Live Dialogue	✓	–	–
Chat Channels	✓	–	✓
Form Builder	✓	✓	–
Premium Software Suite	✓	–	–
90-Day Money Back Guarantee	✓	–	–
Support	24/7 Toll-free Phone, E-mail	24/7 Toll-free Phone, E-mail	24/7 Phone, E-mail
Price Per Month	$9.99	$19.95	$14.99

Vouchers included

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Google AdWords*	$50 value
Citysearch	$50 value

*See terms on page 6 for details.

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1&1 Geographic Map & Driving Directions

Offer convenient directions to your visitors

These handy tools provide your visitors with accurate driving directions and detailed geographic maps. Easily integrated into any website, incorporating these features is fast and simple. Our intuitive software will remember your information and automatically format the map to fit your webpage.

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Maximum power for IT professionals. With maximum web space, bandwidth and advanced developer capabilities, the 1&1 Developer Package was built for those who demand powerful Internet technologies.

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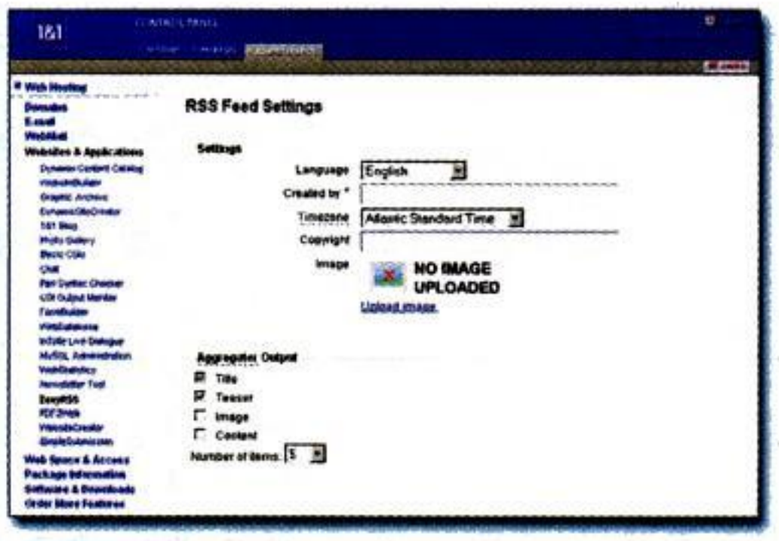
Secure your website!

This first line of defense against online intruders ensures a safe exchange of information over the Internet. The lock icon shows your site visitors that their personal data is secure. A certificate is included with all 1&1 Developer Packages.

EasyRSS

Communication made easy!

Without any technical knowledge required, our EasyRSS enables you to share your message with the world. Distribute your photos, news stories and podcasts quickly and easily. Our feed creator wizard guides you through each step. To update your feed, simply log into your Control Panel and add or delete a post.



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Monthly Transfer Volume	2,500 GB	500 GB
E-mail Accounts	3,000 IMAP or POP3	1,000 POP3
Mailbox Size	2 GB	2 GB
Search Engine Submission	✓	✓
Website Builder	25 Pages	✓
Flash Site Builder	25 Pages	–
Photo Gallery	✓	✓
RSS Feed Creator	✓	–
Blog	✓	✓
Map & Driving Directions	✓	✓
Dynamic Web Content	✓	✓
Web Statistics	✓	✓
E-mail Newsletter Tool	✓	$10/month
In2site Live Dialogue	✓	–
Chat Channels	✓	–
Form Builder	✓	✓
Dedicated SSL Certificate	✓	–
Premium Software Suite	✓	–
90-Day Money Back Guarantee	✓	–
Support	24/7 Toll-free Phone, E-mail	24/7 Toll-free Phone, E-mail
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Vouchers included

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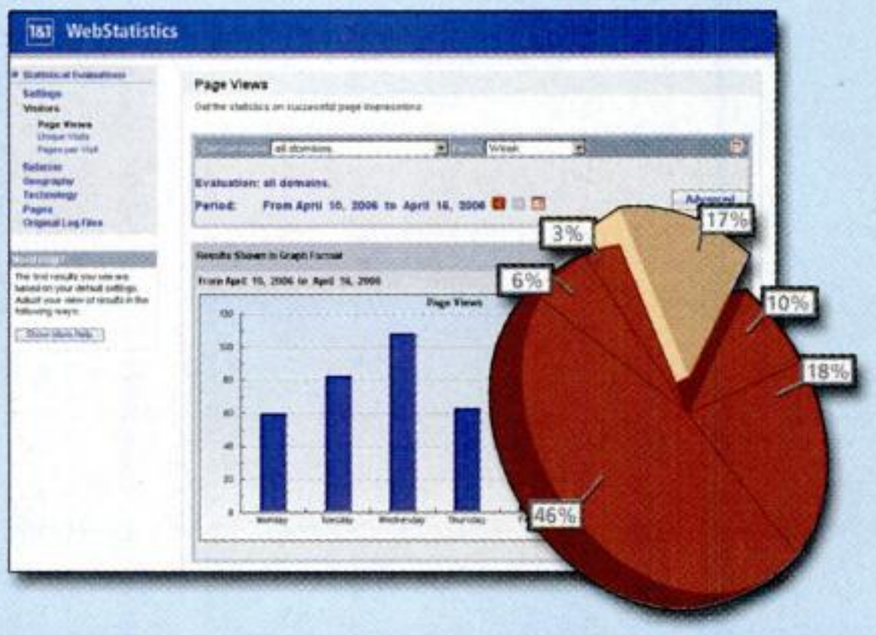
1&1 WebStatistics

Analyze the performance of your website

This new and improved tool lets you track visits, hits, error pages, referrals from search engines, and much more for a detailed analysis of how your website is performing. Select the domain and time period you'd like to analyze and receive automatic management reports with your statistics for weekly, monthly or quarterly performance. Use the data to maximize the success of your website.



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1&1 eSHOPS

Easy, yet sophisticated e-commerce solutions

Simplify e-commerce with 1&1 eShops. Use set-up wizards to build your shop, customizable templates to develop the design, and select the payment option that suits your needs. Your transactions are safe and secure. Our eShop packages are all-inclusive so you don't need to buy a separate hosting package.

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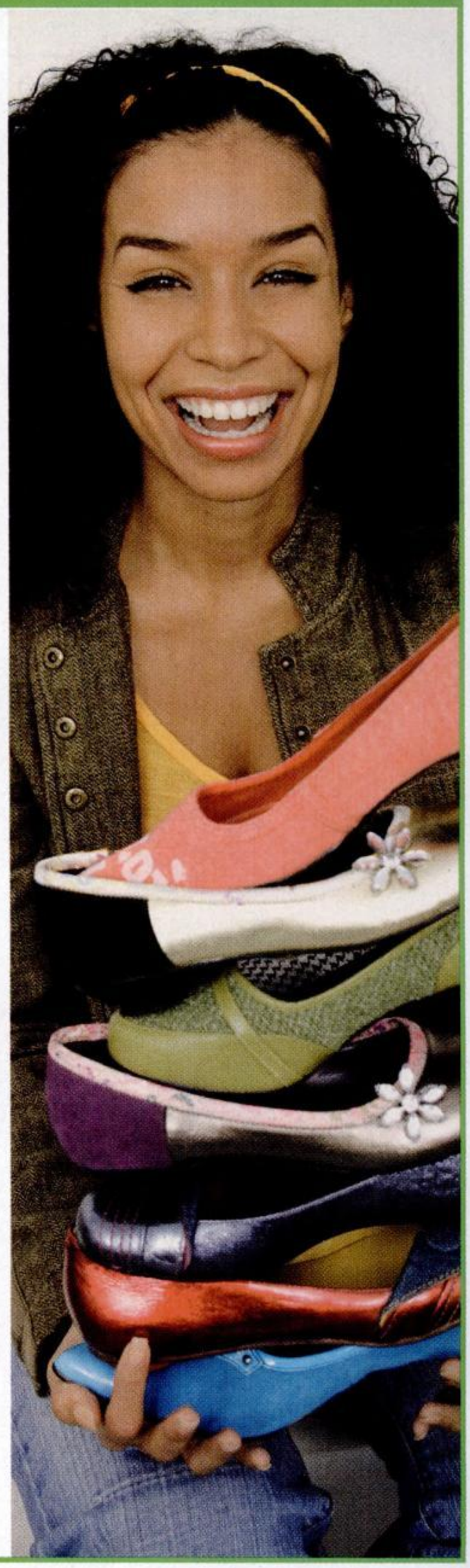

1&1 BUSINESS

- 50 MB web space
- 10 GB/monthly transfer volume
- 50 item product catalog
- Choice of 2 shipping methods
- Hosting included
- Premium software suite
- Free 24/7 phone, e-mail support
- Vouchers included:
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  Google AdWords: $25 value*
  Citysearch: $25 value

$9.99 PER MONTH

1&1 PROFESSIONAL

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- 200 item product catalog
- Unlimited item variants
- Choice of 5 shipping methods
- Hosting included
- Multi-currency support
- Accept secure online payments with PayPal or WorldPay
- Froogle® Export, Google AdWords conversion
- Premium software suite
- Free 24/7 phone, e-mail support
- Vouchers included:
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  Google AdWords: $50 value*
  Citysearch: $50 value

$29.99 PER MONTH

Total price per month. No set-up fee. **1&1 Developer eShop information is available online.**

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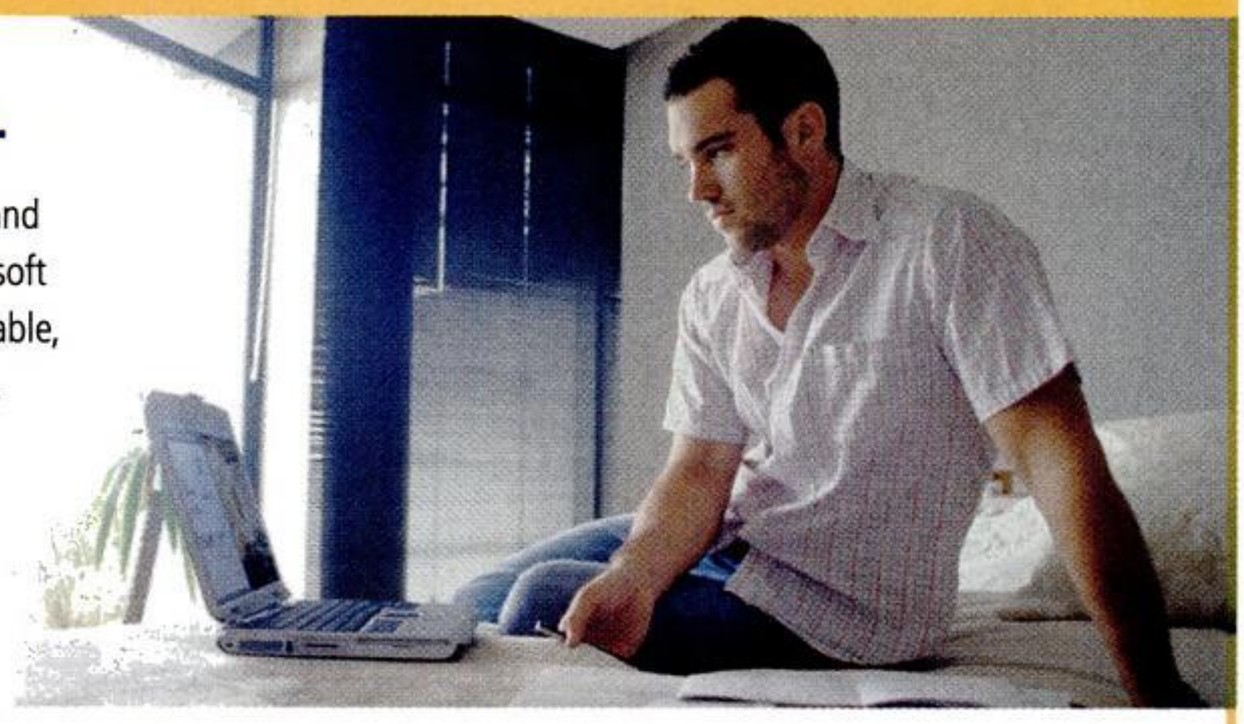
Powerful e-mail for your home or business.

1&1 Instant Mail is ideal for private users and allows you to send and receive personalized mail using your own domain name. 1&1 Microsoft Exchange Hosting gives you or your entire business reliable, affordable, up-to-date access to your critical information – anytime, anywhere.

- ✓ Anytime web access
- ✓ Virus & Spam protection
- ✓ Powerful online communications



1&1 INSTANT MAIL

Mail in an Instant!

What does your ambiguous e-mail address say about you? Are you ready to take your personal e-mail to a more professional level? Then 1&1 has your solution. Simply sign up for 1&1 Instant Mail and then add on your domain. In just minutes you'll have the power to send and receive e-mail from your own domain name.

- 5 e-mail accounts with 1 GB space each – IMAP & POP supported
- Spam filter included for all 5 accounts
- Virus protection for all 5 accounts
- 400 e-mail aliases
- Includes 1&1 WebMail – access mail anytime from anywhere
- Send and receive e-mail from your domain
- Easy setup via the 1&1 Control Panel
- 24/7 phone, e-mail support

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1&1 EXCHANGE HOSTING

Exchange made easy!

Your Microsoft Exchange Hosting Plan from 1&1 lets you enjoy the communication and collaboration features and benefits of Microsoft Exchange without the hassles of maintaining your own Microsoft Exchange server. Read, send and receive e-mail and access your public folders, contacts and calendars at anytime, from anywhere via Microsoft Outlook® or any web browser.

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- Outlook® Web Access
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- Virus Scanner installed on the Exchange Server
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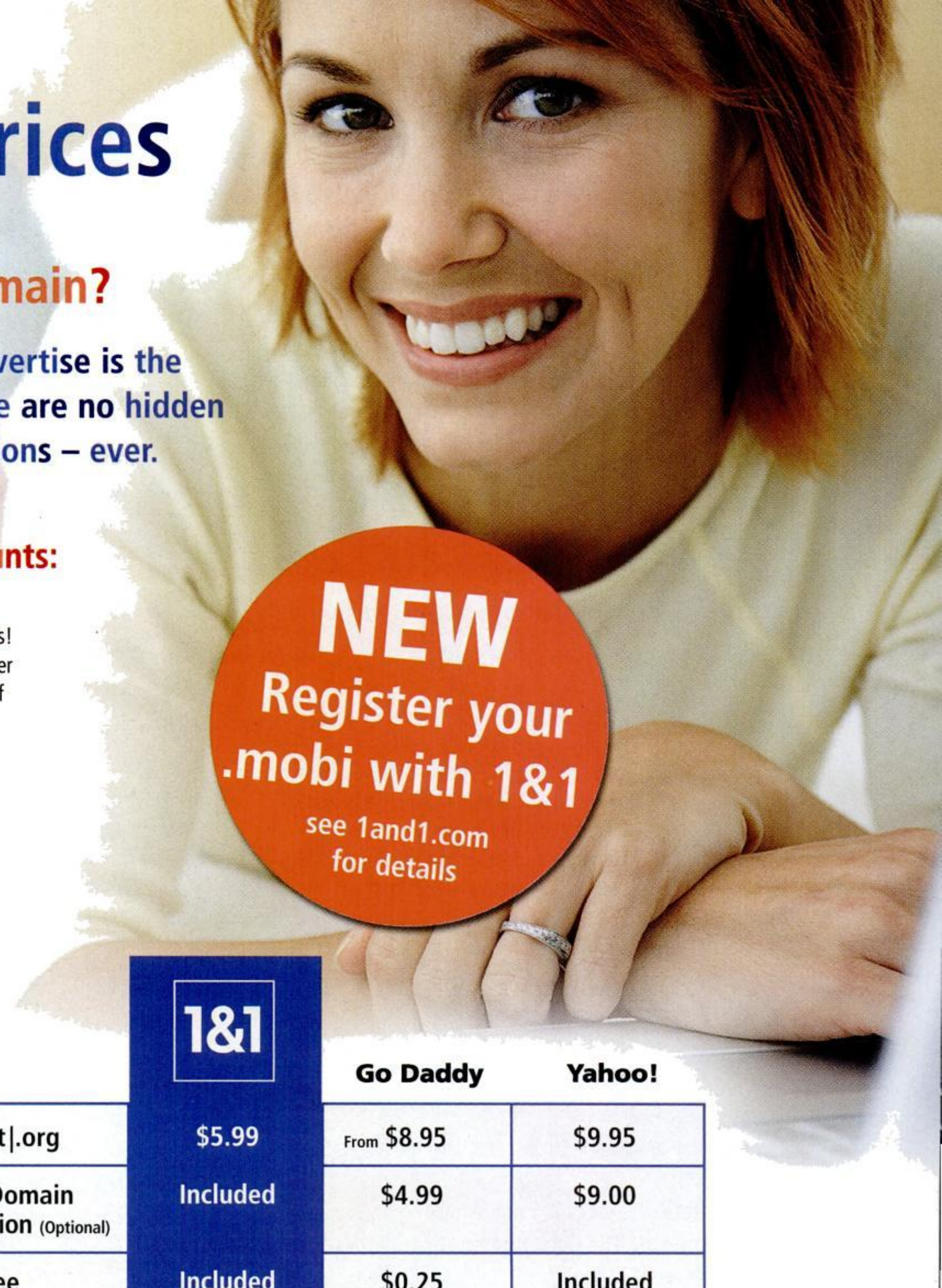

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With 1&1, the price we advertise is the price you pay. Period. There are no hidden fees and no special conditions – ever.

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Protect your contact information from spammers! Your privacy is important. That's why, unlike other registrars, we offer this important feature free of charge.

Starter Website
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applies a weighted blend of the colors of the object and its background. If the multisampling algorithm takes two samples of each pixel, it's referred to as 2x AA. If it takes four samples, it's considered 4x AA, and so on.

Curved lines, obviously, will appear less jagged as the level of sampling increases; but multisampling is not a panacea. Basic multisampling isn't effective, for example, in situations where a game developer depicts a three-dimensional object by wrapping a large bitmap containing transparent regions around a few polygons. This is a common technique used to portray such ordinary objects as chain-link fences and foliage that would be difficult to produce as true 3D models. Because there's no real edge in these bitmaps, there's nothing for the AA algorithm to latch onto. ATI and Nvidia, therefore, have each devised hybrid techniques of supersampling and multisampling to take advantage of the strengths of each while avoiding their shortcomings.

ATI calls its technology "adaptive antialiasing," while Nvidia describes its solutions as "transparency adaptive supersampling" and "transparency adaptive multisampling." Both techniques take multiple passes on areas of the scene that will benefit—such as the aforementioned fences and vegetation—shifting the sample location very slightly on each pass. So even though the object has no true edge, it will be rendered with fewer jaggies.

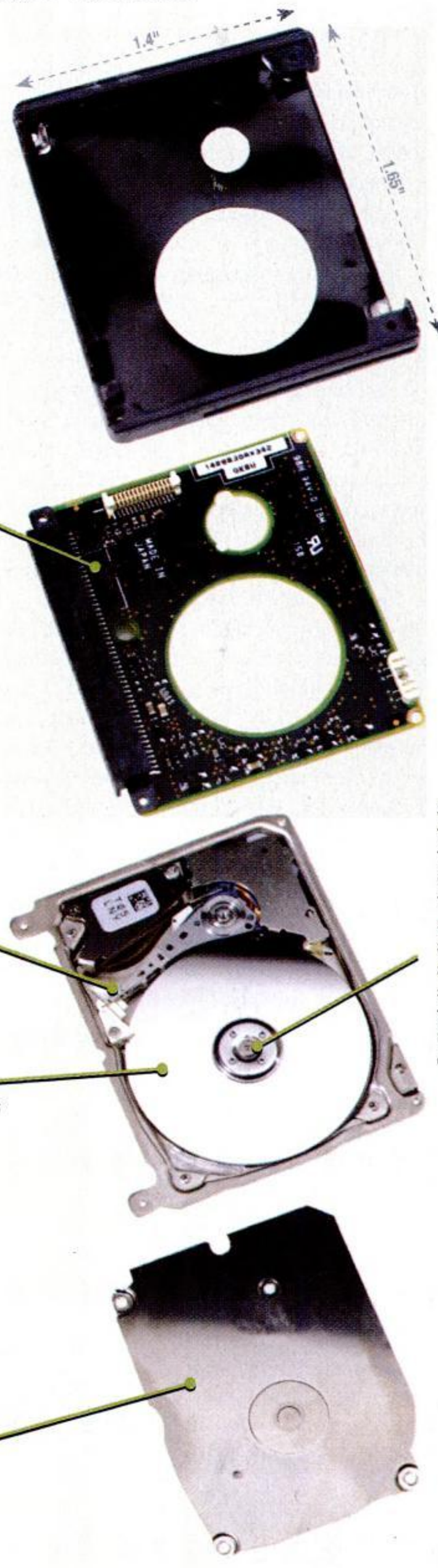
FONT-TASTIC RESULTS

You don't need to load a game or rely on your videocard to experience the effects of antialiasing. Windows XP offers a font-specific AA technique that applies to the text that appears in applications such as word processors and spreadsheets. It's called ClearType, and when you turn it on (right-click your desktop, select Properties, click the Appearance tab, and then the Effects button), it will smooth the curved edges of fonts. It accomplishes this by assigning brightness values to the subpixels that form each letter. ClearType is turned off by default; when you turn it on, text should look less jagged and more pleasing to the eye; some people, however, conclude that it just looks more blurry.

While it's true that antialiasing becomes more difficult to accomplish as more and more pixels are rendered, it's also true that aliasing artifacts become less noticeable as you increase resolution because each individual pixel becomes smaller (assuming the size of your display remains constant). If technology ever enables us to render 7680x4800 pixels on a 24-inch display, antialiasing just might be unnecessary. MPC

Miniature Hard Drive

The first PC hard drives were 5.25 inches wide, more than four inches tall, and boasted a whopping 10MB of storage. Today's mini drives sport several thousand times the capacity and fit in your shirt pocket.



LOGIC BOARD This printed circuit board functions as the interface between the drive and the host controller and operating system.

READ/WRITE HEAD ASSEMBLY This minute arm extends over the spinning platter and rides a cushion of air while writing to and reading from the drive.

PLATTER The platter is a disc of aluminum or glass that's been coated with magnetic particles, which the read/write heads arrange to represent data.

SPINDLE The platter is mounted to this shaft, which is in turn attached to a tiny motor. The motor spins the platter like a record on an old-school turntable, but several thousand times faster (3,600rpm is typical for a mini drive).

ENCLOSURE The drive is sealed in an airtight enclosure, because an incursion of the tiniest speck of dust could destroy the delicate read/write heads.

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Preview

Nvidia GeForce 8800

Nvidia has unveiled the first Direct3D 10 accelerator. Here's everything we know about it, so far.

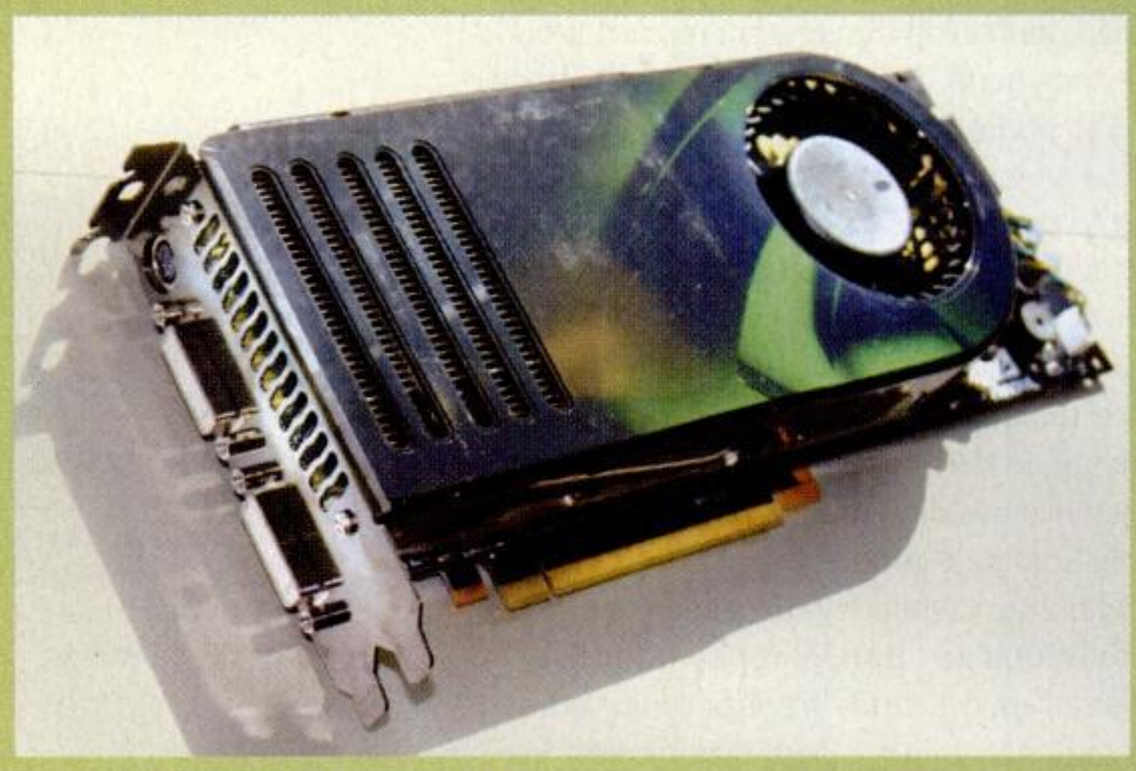
The industry has known for months that Nvidia would be the first GPU manufacturer to introduce a Direct3D 10 part, but absolutely no one anticipated the 681-million-transistor behemoth now lumbering out of the TSMC fabs in Taiwan.

BY MICHAEL **BROWN**

Here's another fact about the 8800 that no one anticipated: It's based on a unified shader architecture. Looking back on everything that Nvidia executives have said—for attribution, off the record, or in guidance they reportedly gave to third-party, supporting-component manufacturers—we've come to the conclusion that either the company made a brilliant course correction in the middle of its product-development process, or it waged an even more brilliant and years-long campaign sowing FUD.

Nvidia chief scientist David Kirk, for instance, has been quoted as saying "there's plenty of mileage left in [discrete shader-unit] architecture," that "change will probably happen progressively," and that Nvidia would release a unified-shader part "when it makes sense." ATI, meanwhile, has openly informed the press that its next part would definitely feature a unified shader architecture, one adopted from the Xenos chip they developed for the Xbox.

Just weeks before Nvidia's announcement, power-supply vendors had been whispering about upcoming videocards that would require 300 watts of power, Nvidia reps quizzed journalists about their thoughts on water-cooling, and "leaked" photos of a G80 prototype card outfitted with what looked like hose connections popped up on the web.



With a unified shader architecture and relatively meager power requirements, Nvidia's GeForce 8800 GTX surprised and delighted us!

Here's the reality: The ultra high-end GeForce 8800 GTX ($600) has 128 shader units (Nvidia calls them "stream processors") running in parallel at 1.35GHz (the core itself runs at a more laid-back 575MHz), and each one is capable of executing geometry, vertex, or shader code. In other words, it's a unified architecture. The GPU has a 384-bit interface to 768MB of GDDR3 memory running at 900MHz.

A reference-design GeForce 8800 GTX card consumes just 185 watts (the GPU has twice as many transistors as the 7950 GT, so it must be incredibly power efficient), and the GPU and memory are air-cooled (by a Zalman-designed cooler very similar to the one on the 7900 GTX). Nvidia claims that a single 8800 GTX is faster than two 7900 GTX cards running in SLI. Nvidia also announced a slightly less-expensive GeForce 8800 GTS that's outfitted with 96 shader units running at 1.2GHz (the core is clocked at 500MHz). Cards using this chip will be equipped with a 320-bit interface to 640MB of memory running at 800MHz; Nvidia expects them sell for to $450.

Nvidia's announcement came just as we were going to press, but you know we'll have a more in-depth report—with coverage of SLI, Nvidia's new antialiasing technologies, hands-on benchmark results, and a whole lot more—in our next issue. Stay tuned.

NVIDIA NFORCE 680I SLI

So you finally got a mobo using Nvidia's 590 SLI Intel Edition chipset? Well prepare to get pissed, because Nvidia is releasing a new chipset that supercedes the late-to-the-party 590 SLI Intel part. Dubbed nForce 680i SLI, the top-end chipset uses essentially the same south bridge as the 590 SLI Intel Edition chipset but adds a redesigned north-bridge chip.

Nvidia has yet to provide a satisfactory explanation for why the 590 Intel Edition arrived so late, but sources outside the company have hinted that poor overclocking performance was the problem. Apparently the 590 SLI IE didn't have the overclocking chops of other Intel chipsets. The 680i should address that in spades. The chipset supports dual x16 PCI-E connections plus a third x16 physical PCI-E slot with x8 electrical plumbing for GPU physics support, packet prioritization, gigabit teaming, massive RAID structures, and a ton of overclocking features.

In a quick test of an early 680i-based motherboard from eVGA, we ran a 1.83GHz Core 2 Duo E6300 up to 2.7GHz with the FSB clocked up to 390MHz, or 1.5GHz, without it breaking a sweat. That's 500MHz out of spec on the FSB. With further tinkering and more voltage, you should be able to take it even further; and, hell, you get SLI to boot. **—GMU**

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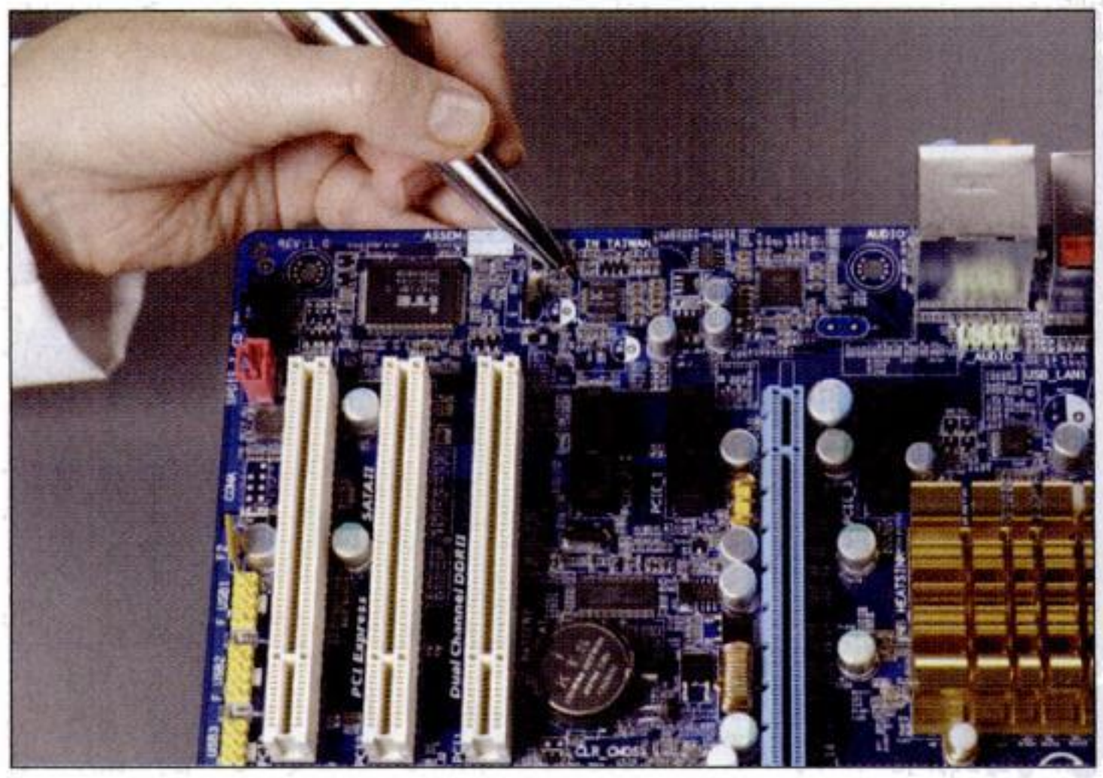
GORDON **MAH UNG**

Examines an Audio Anomaly

Is Realtek cheating on its EAX support?



We were unable to get Realtek's claimed EAX 2.0 support to work on a motherboard equipped with a Realtek ALC883 part.

Vendors often make "cheating" allegations against competitors to the media, but it's normally done on the down-low. Something is muttered just as a meeting is breaking up or said casually during a phone conversation—just enough to seed doubt and perhaps affect a review.

Analog Devices, Inc. (ADI), makers of the audio chips used in many motherboards, is being much more forthright in implicating one of its primary competitors. During this year's Intel Developers Forum, the company demonstrated head-to-head comparisons between an unnamed codec vendor's audio solution and ADI's SoundMax series. In the side-by-side comparison, it was evident that the codec vendor's part wasn't properly rendering audio: sounds that should have been muffled by, say, a closed door or brick wall, weren't. It was also pretty easy to guess who the unnamed vendor was: Realtek, whose control console was easily recognizable in the demonstration.

While such accusations can often be chalked up to the sour grapes of a vendor who's losing market share, Creative Labs weighed in and agreed: Something's not right.

ADI claims that although Realtek is enabling the EAX flag in its drivers, thus informing applications that the codec is able to process more complex audio properties, the EAX calculations aren't actually being performed. This would give Realtek a performance advantage in benchmarks because the CPU is being spared the extra effort required to do the intensive EAX math.

Realtek didn't return numerous emails requesting comment for this column, but its website states that the ALC883 chip supports EAX: "With EAX/DirectSound 3D/I3DL2/A3D compatibility, and excellent software utilities like Karaoke mode, environment emulation… the ALC883 series provides an excellent entertainment package and game experience for PC users."

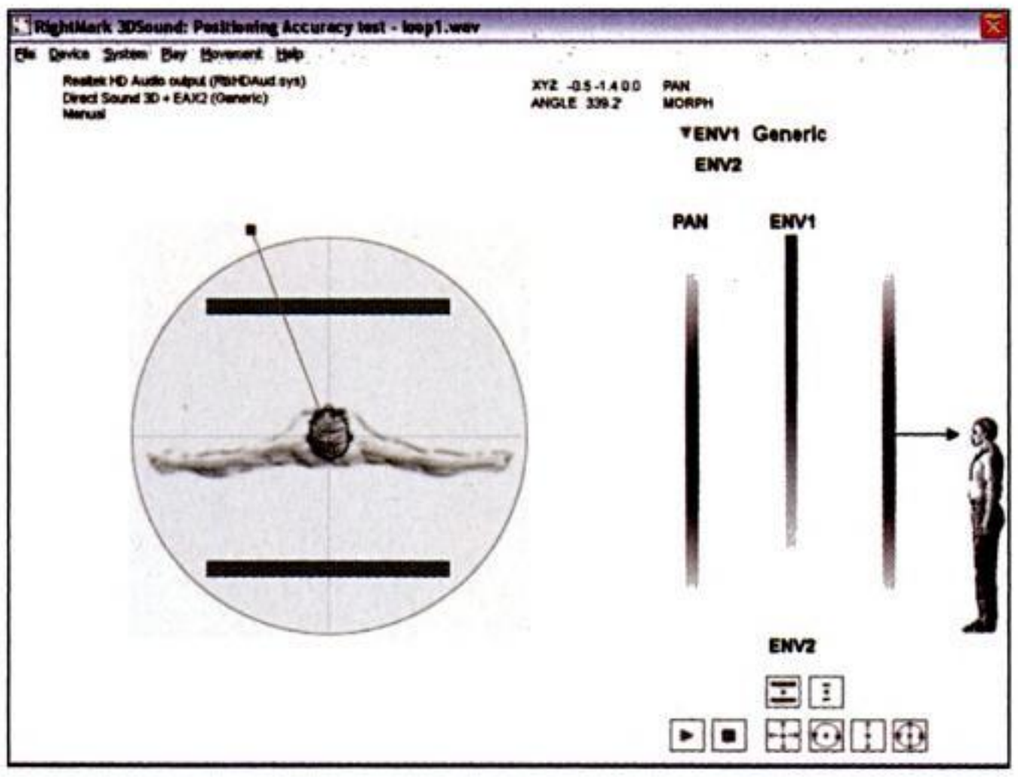
But does it? To test the allegation, I fired up a system with a Realtek ALC883 HD Audio codec and compared it with a system sporting a Sound Blaster X-Fi. Using RightMark's *3DSound* (**www.rightmark.org**), I enabled EAX, and fired up the occlusion and obstruction tests. With the X-Fi, the audio seemed appropriately filtered when an object was placed between the listener and a sound source. With the Realtek part, the sound didn't change in the presence of an obstruction, even with the latest drivers available from the company.

I also fired up *Battlefield 2* on the X-Fi and Realtek boxes and donned a set a pair of Etymotic's superb ER-4P earbuds. The audio in the game was set to render for headphones, and the $300 earbuds ensured that background fan and AC noise in our Lab would be eliminated.

With the X-Fi, *BF2* sounded stellar, with the audio cues working perfectly. A tank or helicopter in the distance or moving behind a building sounded as it should. With the Realtek part, there was a cacophony of sound and I was unable to use audio cues to tell whether a tank was 100 meters away or 10 meters away. It seemed like the only choice the driver had was 100 percent volume or none.

There are three main players in onboard audio today: ADI, Realtek, and Sigmatel. ADI's SoundMax functionality works as expected. Sigmatel, for its part, doesn't claim EAX support in its driver, but its sound isn't horrible. Using the ER-4P earbuds with a Sigmatel-equipped Intel D975XBX board, I found the *Battlefield 2* experience to be decent. Not stellar like the X-Fi, but palatable. Of all the boards we tested, Realtek's performance was atrocious, the very definition of "bad onboard audio."

But is Realtek intentionally cheating, or is this all the fault of a software bug? Because I tested the ALC883 using the latest drivers for both the mobo and the audio part, it's hard to see how a bug could slip through. Still, we're willing to give Realtek the benefit of the doubt, but only if the company addresses the issue in the near future. Rest assured, however, we'll be paying closer attention to the company's onboard sound going forward, and it will likely color our opinions of motherboards, notebooks, and systems that use the part.



Moving a sound object behind the wall in RightMark's *3DSound* test (see small box above the circle) should muffle the sound. We heard no changes in the sound using a Realtek onboard codec.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC,* our mantra for testing has always been "real world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six benchmarks we use to test every system we review.

SYSmark2004 SE: This is an update of the *SYSmark2004* benchmark, which uses a suite of such common applications as Microsoft *Word, Excel, PowerPoint*, Macromedia *Dreamweaver*, *Flash,* and *Winzip* to test general performance. It isn't heavy in multithreading, but it does feature multitasking tests.

Adobe Premiere Pro 2.0: We finally ditched our old standard-def *Premiere* test for one that uses high-def source material. The test is multithreaded, uses the GPU for transitions, and is brutal. It takes about an hour on our zero-point to render a short two minute, 46 second benchmark movie in the program.

Adobe Photoshop CS2: We start with a RAW photo shot with a Canon EOS 20D, and apply a crapload of filters and other tasks from *CS2* to see just how fast a rig can chew through the workload. Because we use every filter we can, the test is more fair and balanced than the usual cherry picking of *Photoshop* tests.

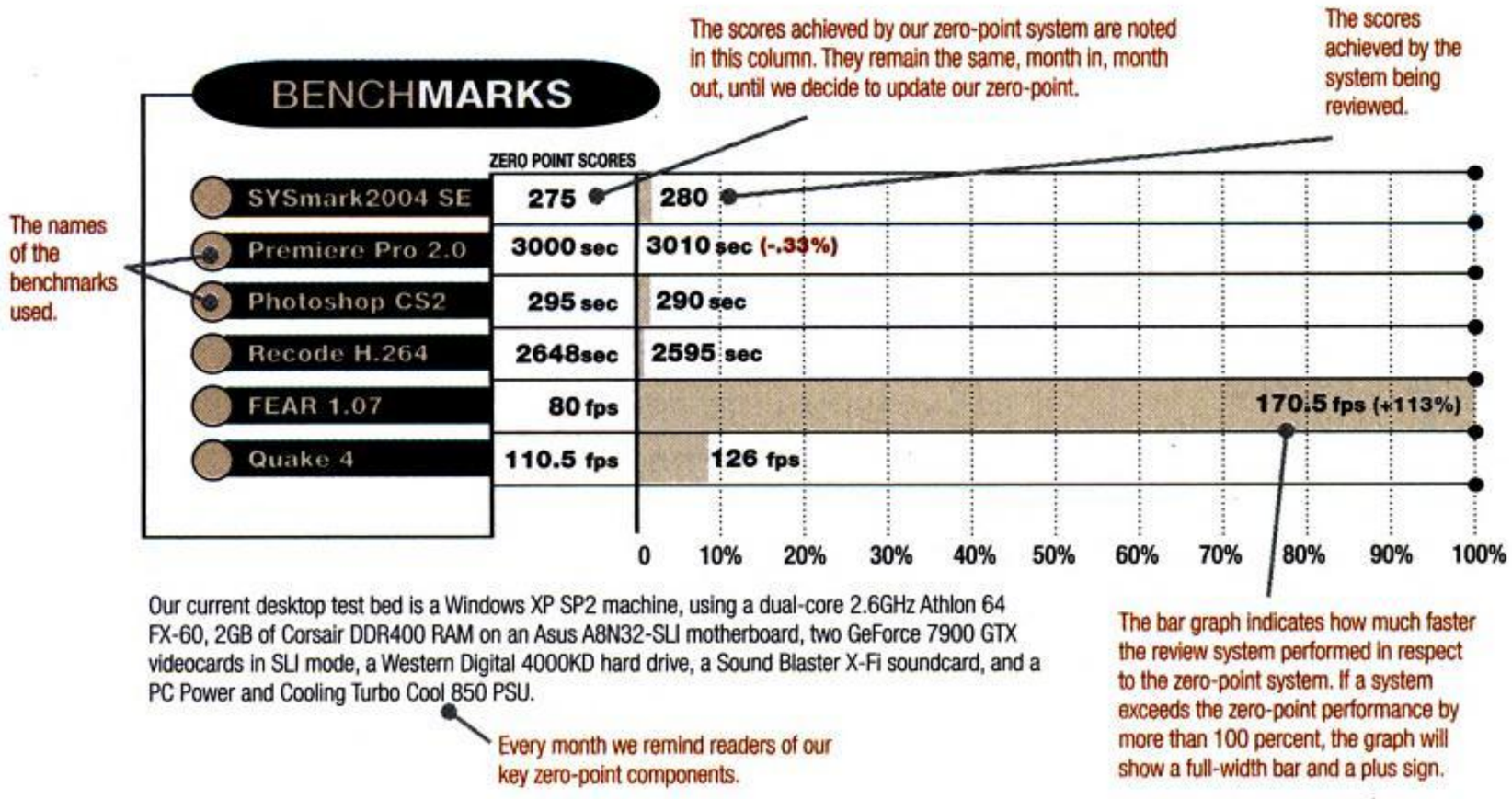
Ahead Nero Recode 2.0: *Nero Recode 2.0* is one of the fastest video-transcoding utilities. We copy unencrypted VOB files to the hard drive, then convert the movie to an H.264 file formatted for the Apple iPod's screen. The version included with *Nero 7.5*, is the only multithreaded H.264 encoder we've found thus far and is optimized for dual-core CPUs.

Quake 4: Based on the *Doom 3* engine, *Quake 4* is a popular OpenGL game. We run our test at 1600x1200 with 4x antialiasing and 4x anisotropic filtering. Generally, more robust OpenGL drivers yield better performance. We use a custom timedemo recorded using the 1.2 patch, which supports Hyper-Threading and dual-core processors.

FEAR: Monolith's *FEAR* is a cutting-edge DirectX game that pushes PCs and graphics hardware to the limit. We run *FEAR* at 1600x1200 with soft shadows, physics, and audio acceleration enabled, using the 1.07 patch.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.


The scores achieved by our zero-point system are noted in this column. They remain the same, month in, month out, until we decide to update our zero-point.
The scores achieved by the system being reviewed.
BENCHMARKS
ZERO POINT SCORES
The names of the benchmarks used.
SYSmark2004 SE
275
280
Premiere Pro 2.0
3000 sec
3010 sec (-.33%)
Photoshop CS2
295 sec
290 sec
Recode H.264
2648sec
2595 sec
FEAR 1.07
80 fps
170.5 fps (+113%)
Quake 4
110.5 fps
126 fps
0
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.
Every month we remind readers of our key zero-point components.
The bar graph indicates how much faster the review system performed in respect to the zero-point system. If a system exceeds the zero-point performance by more than 100 percent, the graph will show a full-width bar and a plus sign.

LAB NOTES

A couple helpful hints for working with hardware

POWER OFF YOUR MOBO

Over the last year, we've run into some memory issues with our nForce4 motherboards. Sometime the solution was to move the modules into different DIMM slots until the board booted; sometimes we had to swap the module out for another. In the end, we had about six DIMMs labeled "flaky." We've never nailed down an exact reason for the incompatibility, but now we have a pretty strong suspicion what the problem is.

Lately, we've noticed board manuals warning that the nForce4 chipset is particularly sensitive to damage if you don't power down your motherboard before removing modules. While we normally preach this to readers, not all of our editors practice this, and we suspect that slight voltage spikes to the DIMMs might have damaged them. The lesson is simple: power down the system and discharge the PSU before removing *any* components.

USE THE FREE TOOL

There's a surprise treat in every PC that you probably don't even know about it. It's the little metal cover that you remove from the back of your case before you install a videocard or soundcard. Normally the part goes into the garbage, but we've found a perfect use for the slot cover: The L-shape is perfect for accessing difficult-to-reach PCI-E retention clips, even in systems that have dual-slot graphics cards, which block access to the clip. And it's free!

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Yamaha RX-V2700 A/V Receiver

Now this is a powerhouse entertainment system

The RX-V2700's front-panel display is too small to be useful, but we dig the TV GUI.

The consumer electronics industry is finally beginning to deliver on the much-ballyhooed concept of convergence. Consider Yamaha's new RX-V2700: This high-end A/V receiver will accommodate every CE device you can think of. It also features a USB port for MP3 players and 10/100Mbps Ethernet for connecting to a network. Own an iPod? Drop an extra 100 bucks for the custom iPod dock—it's worth every penny.

You'll find front-panel inputs and a few controls behind this drop-down door, but we found ourselves wishing we could choose each playback source with one button.

Yamaha's engineers didn't just slap these features into the RX-V2700's 38-pound chassis—they conceived of technologies that enhance the media pumping from your PC, streaming box, MP3 player, or iPod. The Compressed Music Enhancer algorithm, for example, re-infuses MP3, WMA, and other audio files with much of the psycho-acoustic vibe that gets stripped out during compression. The analog signals from composite, component, and S-video sources can be upscaled to 480p, 720p, or 1080i and output through an HDMI 1.2a connection.

The receiver has such an abundance of inputs and outputs, settings, and features that setting it up could be intimidating. Fortunately, Yamaha has developed an intuitive GUI (displayed on your TV) and a full-featured remote control that render the basics exceedingly simple. (OK, we'll fess up to cracking the 150-page user manual to figure out some of the receiver's more advanced features.)

You also use the GUI and remote to browse and select the contents of a docked iPod, a flash drive plugged into the front USB port, audio from shared folders on a networked PC (via Microsoft's Windows Media Connect 2.0), and podcasts and Internet radio stations (via an Internet connection to the Vtuner database).

DRM issues do spoil the party somewhat: You can't stream protected audio files from your PC, and you can't even access unprotected tunes stored on a connected MP3 player's media partition—songs must be stored on the data partition. And why can't you stream video over Ethernet? The remote control, meanwhile, is limited to browsing, starting, and stopping tracks.

None of these restrictions apply to an iPod, because Yamaha's YDS-10SL feeds remote-control instructions to the player and accesses its analog audio and video outputs via the dock. This deprives you of the receiver's exquisite 192KHz/24-bit Burr-Brown DAC on the audio side, but we've never seen the iPod's low-res video look so good.

SPECS

AMPLIFIER	140 watts x 7 channels, 0.04% THD
AUDIO CODECS	Dolby Digital, Dolby Digital EX, Dolby Pro Logic, Dolby Pro Logic II, Dolby Pro Logic IIx, DTS, DTS-ES, DTS Neo:6, DTS 96/24, Neural Surround (for XM), Yamaha Virtual Cinema DSP, Yamaha Silent Cinema (for headphones)

The RX-V2700 features an improved version of Yamaha's Parametric Room Acoustic Optimizer, a tool we first encountered with the company's YSP-800 Digital Sound Projector. To calibrate the RX-V2700 and your speakers for your specific listening environment, set the omni-directional mic at ear level in your normal sitting position; plug the mic into the receiver's front panel; and press a couple buttons on the remote. The YPAO takes care of the rest, including testing the polarity of your speakers to ensure they're wired properly. If you don't like the results, you can override any of its choices.

The day you run out of inputs to the RX-V2700 is the day you've acquired too many toys (or too many Monster cables—the optical jacks on the back are so close together that we couldn't insert two of these cables next to each other because their oversized plugs wouldn't fit.) In addition to the aforementioned PC-centric devices, the

INS AND OUTS

HDMI 1.2A	Three inputs, one output
COMPONENT VIDEO	Three inputs, monitor output
COMPOSITE AND S-VIDEO	Five inputs, two outputs, monitor out, zone 2 (composite only)
DIGITAL AUDIO	Three coaxial inputs, four optical inputs, two optical outputs
ANALOG AUDIO INPUTS	Phono, CD, CD-R, MD/tape, video (5), multichannel, (front, center, surround, subwoofer) MD/tape, CD/R, DVR/VCR (2)
ANALOG AUDIO OUTPUTS (RECORD)	Front, center, surround, subwoofer, surround back, presence
SPEAKER CONNECTION	Front, center, surround, surround back, presence/zone 2, zone 3
FRONT-PANEL A/V INPUTS/OUTPUTS	Composite and S-video, analog audio, optical digital audio inputs, headphones
BACK-PANEL IR REMOTES	Two inputs, two outputs
OTHER	iPod Dock, Ethernet, USB, XM antenna, control outputs (2)

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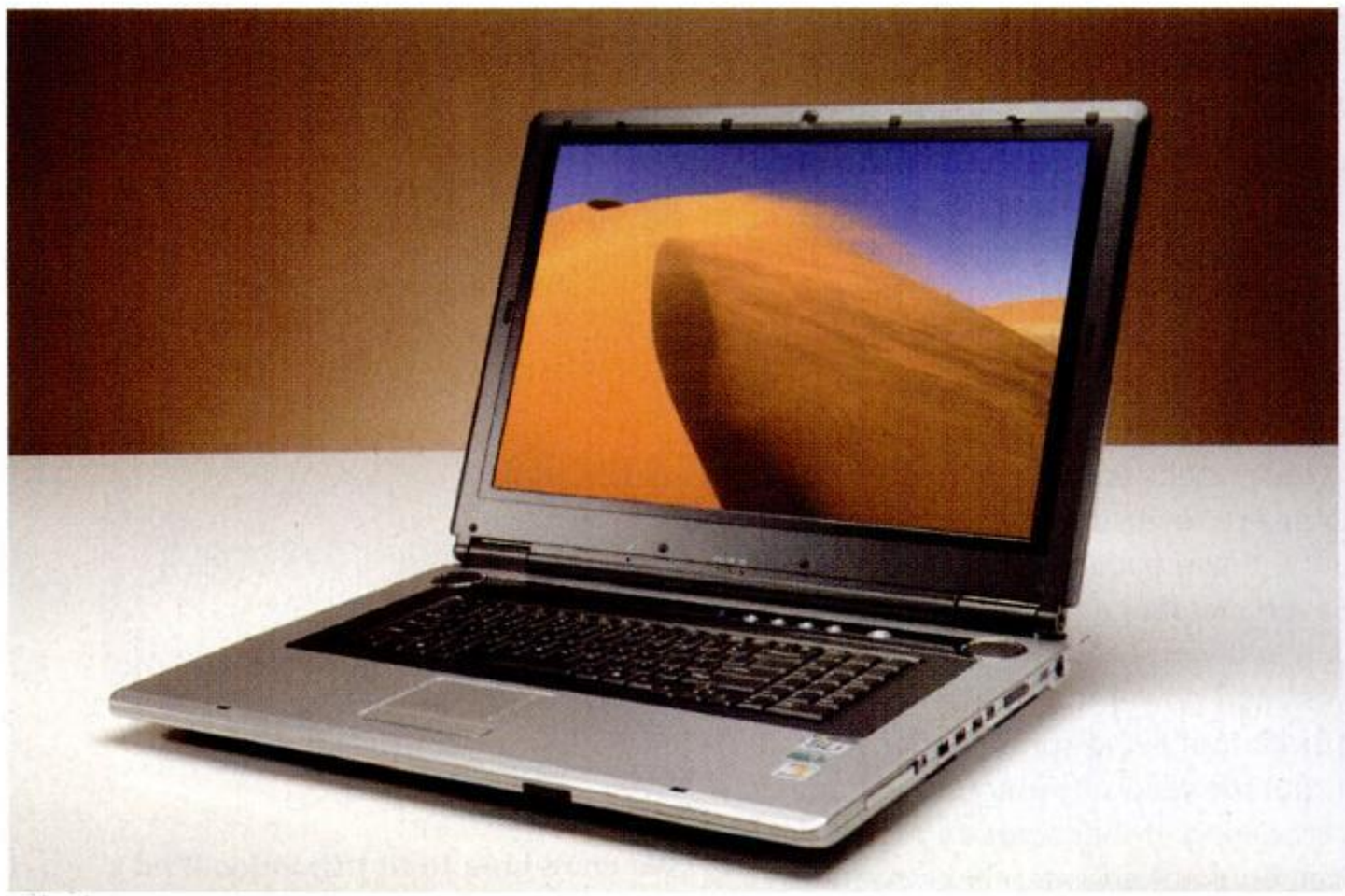
HP dv9096xx

Baby steps on the path to portable gaming



The dv9096xx's fancy stylings belie its low price and mask its middling performance.

We've said it before, and we're saying it again: HP ain't exactly famous for its gaming rigs. But to our surprise, the company has raised the bar for itself with the dv9096xx, a 17-inch movie-centric desktop replacement with a lot more graphics action than we've come to expect from the sensible-shoes crowd at HP. Unlike the nc6320 we reviewed in our June 2006 issue—along with just about every other HP notebook we've ever seen—the dv9096xx comes equipped with a 256MB Nvidia GeForce Go 7600 GPU.

Anyone who's followed the evolution of HP's desktop replacement systems will find many of the dv9096xx's other attributes to be familiar. This smartly dressed system sports HP's signature brand of industrial design, right down to the wavy "imprint" finish on the outside of the case and surrounding the spacious keyboard. Like other dv9000-series notebooks of yore, this model features a big ole Altec Lansing speaker grille (which houses a pair of respectable speakers) for surprisingly rich audio. The bass still leaves plenty to be desired, but we'd gladly watch our favorite flicks on the road with this audio accompaniment.

Eschewing rear-mounted ports altogether, the dv9096xx packs all of its ports into the sides, but for a trio of audio jacks and an IR port on the front edge. While it lacks a PC Card slot, the dv9096xx includes four USB ports (two on the left, two on the right), an ExpressCard 54 slot, a 5:1 media reader, a mini FireWire port, mini HDMI, VGA, and S-video out, in addition to gigabit Ethernet and a modem. It also has HP's Expansion Port 3 for connecting to a docking station at the office.

The big problem with this laptop is its poor battery performance. It craps out after an hour of play, while the Toshiba Qosmio, which we reviewed in July 2006, kept fragging for another half-hour or so. Still, if you carry your power brick along with you, this system can take on its portable rivals in both performance and price, as it sells for just over two grand—a few hundred bucks cheaper than similarly spec'd gaming notebooks.

Sometimes you just want to kick back and take in a show. And for that, the dv9096xx is well-equipped with its Toshiba read-only HD-DVD drive, 1440x900 Ultra Brightview display, and included ExpressCard remote control. But once again, you'll face the wrath of the power gods if you forget to pack your AC adapter, because this big boy simply won't stay awake through the average feature film.

If you're searching for a savvy blend of price and performance, this desktop replacement from HP certainly fits the bill, so long as you're not planning to spend too much time gaming or stray too far from a desk (or at least from a power source). To truly compete with similar rigs from Alienware and Voodoo, HP is going to have to step up its game in the battery and GPU departments.

–ROBERT STROHMEYER

UNDER THE HOOD

BRAINS	
CPU	2GHz Intel Core Duo T7200
RAM	2GB DDR2 667MHz
LAN	Intel Pro/1000PL, 802.11b/g, modem
HARD DRIVE	Dual Seagate 100GB, 5,400rpm, SATA
OPTICAL	TS-L802A DVD-RW/HD-DVD ROM
BEAUTY	
VIDEO	256MB Nvidia GeForce Go 7600
DISPLAY	17-inch WXGA+ 1,440x900 Ultra Brightview
AUDIO CHIP	16-bit Sound Blaster integrated
LAP WEIGHT	7lb, 13oz
CARRY WEIGHT	9lb, 2.3oz
BOOT: 53 sec.	DOWN: 18 sec.

HP DV9096XX

JACKED IN

Mediocre frame rates for gaming on the go.

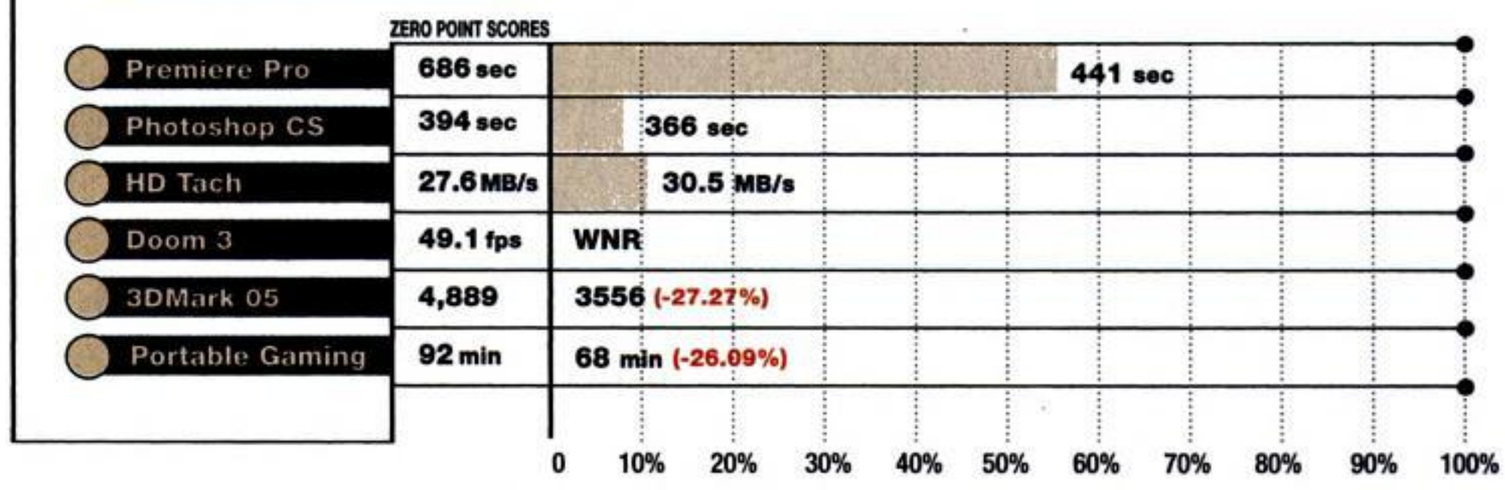
JACKED UP

Midrange GPU and an hour's worth of battery power.

7

$2,086, www.hp.com

BENCHMARKS



Our zero point is a Dell Inspiron XPS, with a 2.13GHz Pentium M, 1GB of DDR2/533 RAM, and a GeForce Go 6800 Ultra.

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